



**FAG**

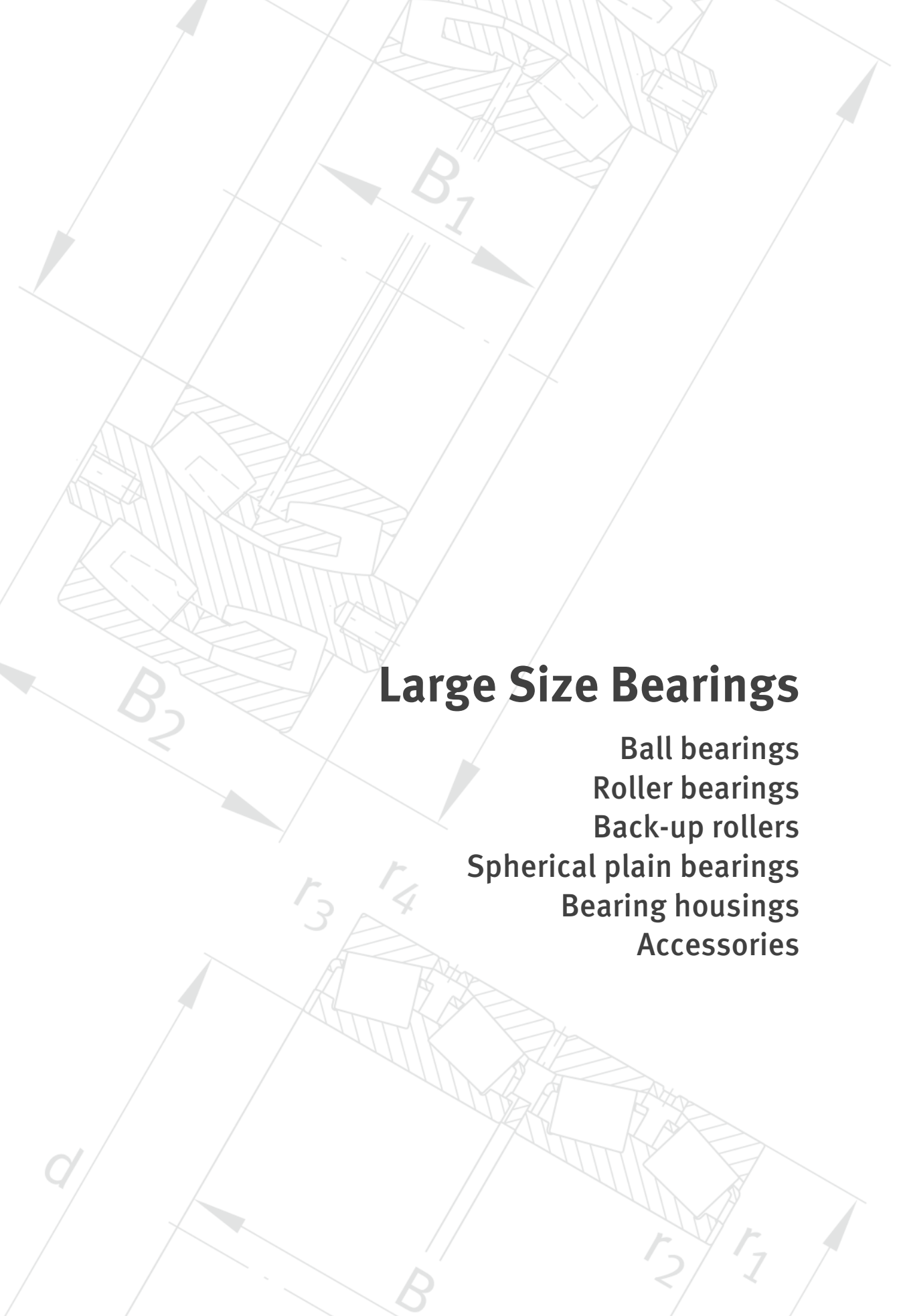


## Large Size Bearings

Ball bearings  
Roller bearings  
Back-up rollers  
Spherical plain bearings  
Bearing housings  
Accessories

**SCHAEFFLER**





## Large Size Bearings

- Ball bearings
- Roller bearings
- Back-up rollers
- Spherical plain bearings
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- Accessories

All data have been prepared with a great deal of care and checked for their accuracy. However, no liability can be assumed for any incorrect or incomplete data. We reserve the right to make technical modifications.

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# Foreword

## Schaeffler Technologies

Schaeffler Technologies with its brands INA and FAG is a leading worldwide supplier of rolling bearings, spherical plain bearings, plain bearings, linear products, accessories specific to bearings and comprehensive maintenance products and services.

It has approximately 40 000 catalogue products manufactured as standard, providing an extremely wide portfolio that gives secure coverage of applications from all 60 designated industrial market sectors.

The central factors responsible for this success are our outstanding strength in innovation, our global focus on local customer proximity, highly developed manufacturing methods, extremely high quality standards in all processes and our ability to transform specific customer requirements quickly and accurately into cost-effective solutions. Against this background of expertise, knowledge and experience together with our wide range of catalogue items, we see ourselves as a high performance, customer focussed partner.

## Research and Development

As a company looking to the future, we are especially active in the field of research and development. The key areas in this respect include not only research into fundamental principles, materials technology, tribology and calculation but also extensive inspection and test methods as well as activities to optimise manufacturing technology. This is oriented towards ensuring the continuous development, improvement and application of our products in the long term.

We carry out research and development on a global basis.

Our development centres are linked with each other worldwide and are thus in a position to exchange current information on a very short timescale as well as access and communicate the most recent data. This ensures that a uniform level of knowledge and information is available worldwide.

In addition to continued development of standard products, we work closely in research and development activities with our customers where specific customer solutions are required. They can thus benefit from the best product for their application, with the maximum possible performance capacity at a cost-effective price.

## Quality Manufacturing technology Environmental protection

“Zero defects” is our quality objective. We have matched all our processes, both in product development and in manufacturing, to this target.

Our comprehensive know-how in forming, in forging, in heat treatment and surface technologies, in hard machining by means of grinding and honing and in assembly processes is applied in order to ensure that our products fulfil the required quality level.

Our manufacturing processes are monitored by means of systematic quality inspections. This ensures that all products continuously fulfil the same high standard of quality.

All Schaeffler sites worldwide are certified to ISO/TS 16949:2009 and DIN EN ISO 9001:2008.

With the validation and certification of our manufacturing sites, we are taking a pioneering role in environmental protection.

All larger manufacturing sites are certified to ISO 14001 and are also validated in accordance with the more stringent EC ECO Management and Audit Scheme (EMAS).

# Foreword

## Worldwide presence

Through a closely knit network of development and manufacturing sites, sales companies and an international distribution structure, we are represented throughout the world. This global presence ensures effective linkage between the major markets in Europe, India, South East Asia/Pacific Region, East Asia, North and South America.

As a result, we have an on-site presence with service and technical advice in close proximity to the customer.

We take orders from throughout the world and make deliveries worldwide too. Furthermore, we support our customers worldwide in resolving their bearing arrangement requirements, respond to technical queries and develop specific bearing arrangement solutions in local partnership with our customers.

## Large size bearing catalogue GL 1

### An engineering compendium

Catalogue GL 1 is based on our proven catalogue HR 1, Rolling Bearings. It gives descriptions of standard rolling bearings with an outside diameter of 320 mm or greater and the appropriate accessories as well as numerous special rolling bearings and large plain bearings.

We are thus offering an overview of our product range for large and heavy machinery for the original equipment manufacture, distribution and aftermarket sectors. In order to facilitate the selection of suitable products, reference is made at many points to typical applications.

The catalogue shows which products can be considered for a bearing arrangement, the factors that must be taken into consideration in the design, the tolerances required on the adjacent construction and how the bearing arrangement is sealed.

It gives detailed information on the calculation of bearing rating life, on temperatures and loads, on the lubricants that are most suitable for the bearing arrangement and, last but not least, on how the products are correctly mounted and maintained.

The data represent the state of current technology and manufacture as at April 2009. They take account of the progress in rolling bearing technology as well as the experience gained in numerous applications. Any information in publications that does not concur with the data in this catalogue is therefore invalid.

## Definition of the Attention symbol

This catalogue gives descriptions of standard and special bearings. Since these are used in numerous applications, we cannot make a judgement as to whether any malfunctions will cause harm to persons or property.

## Follow instructions

It is always and fundamentally the responsibility of the designer and user to ensure that all specifications are observed and that all necessary information is communicated to the end user. This applies in particular to applications in which product failure and malfunction may constitute a hazard to human beings.



In line with ANSI 535.6-2006, we have replaced the old Attention symbol by this new symbol.

In case of non-compliance, damage or malfunctions in the product or the adjacent construction may occur.

**X-life**  
**Maximum customer benefit**

X-life is the premium brand of Schaeffler. It brings together the strengths of the two brands and gives completely new design opportunities for design engineers.

X-life is an all-encompassing concept: advice, product development, service and sales are fully integrated with each other in all phases of the product cycle.

As a service surround system, it includes a comprehensive lubricant concept. In addition, X-life stands for continuous quality improvement and local customer focus applied worldwide.

**Advantages  
of the X-life grade**

The use of state of the art manufacturing technologies has resulted in a better, more uniform surface over the whole contact face between the rolling elements and raceway.

As a result, under identical load there is a significant reduction in the stress conditions present on the rolling elements and raceway. The improved surface quality gives reduced friction and lower bearing temperatures, running resistance is lower and less strain is placed on the lubricant.

Thanks to such improvements, the basic dynamic load ratings are significantly higher than those of the previous design.

As a result, the basic rating life is higher; i.e. the operating life of the bearings is considerably longer under the same operating conditions. Alternatively, higher loads can be applied while maintaining the same life values.

With their optimised characteristics, X-life bearings open up completely new application prospects, such as downsizing of the bearing arrangement. Furthermore, the improved price/performance ratio ultimately increases the overall cost-effectiveness of the bearing arrangement.

X-life bearings are described in the sections on product features and are indicated in the dimension tables by the symbol XL.

**Product ranges  
for specific market sectors**

Special product ranges are available for specific market sectors. In addition to standard products, these include a large number of special solutions.

The range extends from simple, application-specific bearings via complete, ready-to-fit systems to special solutions that can be used to fulfil the most complex bearing technology requirements with high functional security and cost-effectiveness.

Contact our External Sales at the earliest possible stage and benefit from the broad knowledge and considerable experience of these specialists for your project.

# Foreword

## ***medias*<sup>®</sup> professional** **Electronic information system**

*medias*<sup>®</sup> professional, the proven selection and information system, presents the INA and FAG catalogue products in electronic format. As with the printed catalogue, this gives our customers product information on both brands in a single data source. This saves time and gives easier handling.

*medias*<sup>®</sup> professional is available online in several languages, is easy to navigate and is particularly clear thanks to the use of numerous pictures, diagrams and models. There are also highly representative application examples, classified by market sector.

Datasheets on the bearing series can be generated as PDF files. It includes a lubricant database and also the web2CAD link for direct download and integration of 3D models.

*medias*<sup>®</sup> professional focusses on the individual bearing. The complete shaft can be simulated and any influences on the bearings as a result of shaft deformation can be determined using the calculation program BEARINX<sup>®</sup>. This program can also be made available to direct customers as BEARINX<sup>®</sup>-Online via the Internet (for conditions, see the INA and FAG homepage).

In conclusion, *medias*<sup>®</sup> professional is a comprehensive, reliable system to help you answer many questions on rolling bearing technology by electronic means, quickly and at any location.

## **Other technical publications**

This catalogue contains a large proportion of the core rotary rolling bearing range as well as numerous special rolling bearings of the brands INA and FAG. It also includes large INA radial and axial spherical plain bearings.

Furthermore, we develop and manufacture many other products and systems that are of significant interest in terms of technical progress and cost-effectiveness for rotary and linear bearing arrangements as well as for the automotive sector. These are covered in separate technical publications that can be obtained upon request.



## **INA and FAG**

### **When it comes to motion**

Catalogue GL 1 stands for pioneering bearing technology, application-focussed advice, the highest product and performance density and continuous development.

The benefits to you:

- selection of products from a vast product range
- maximum benefit, since the most suitable product is used in the right place
- worldwide product availability
- short delivery times
- long term supply capability
- security of planning for the long view
- simplified stockholding
- market-competitive prices
- global service
- comprehensive, application-focussed advice.

### **Together we move the world**

For us, technical progress means never standing still.

In partnership with you, we are continually working on new solutions so that your vision and our technical ideas can continue to become a reality, to your benefit.

With our products and our knowledge, we can together continue to fulfil the challenges of your market in relation to bearing arrangements. To this end, this catalogue is an important instrument.



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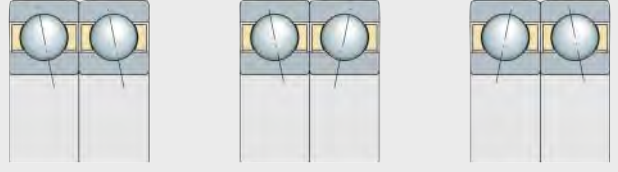
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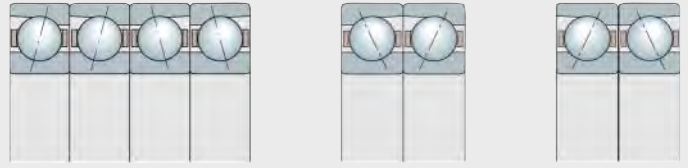
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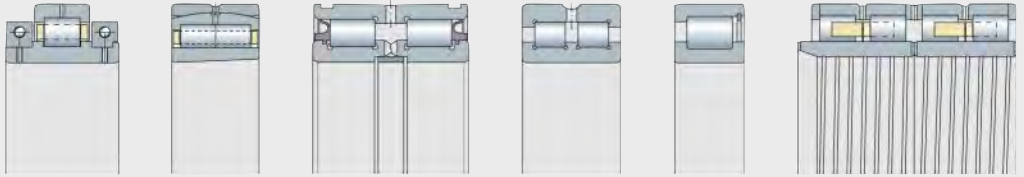
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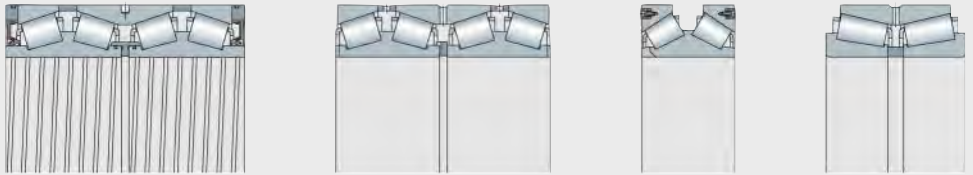
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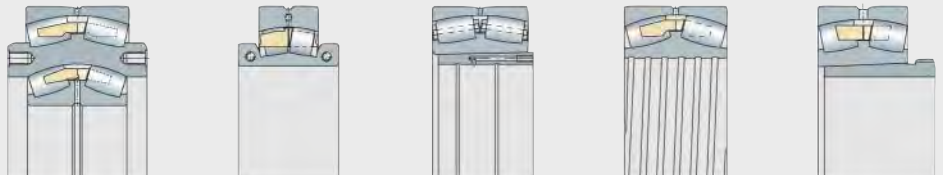
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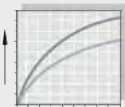


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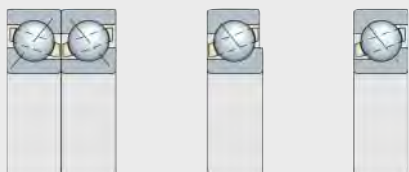
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## Technical principles



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## Deep groove ball bearings



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## Angular contact ball bearings



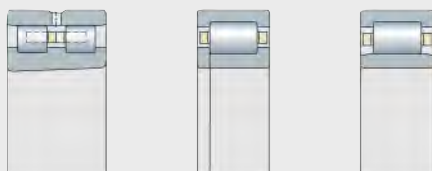
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## Spindle bearings



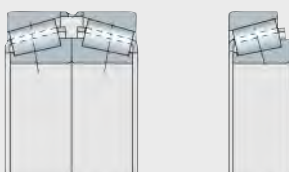
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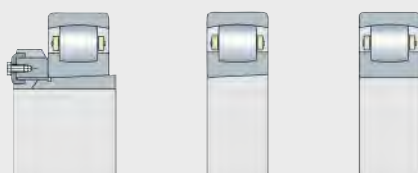
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## Cylindrical roller bearings



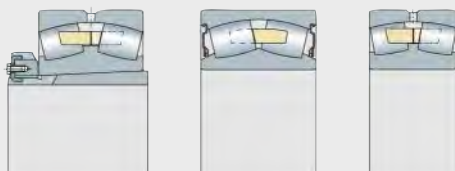
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## Tapered roller bearings



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## Barrel roller bearings

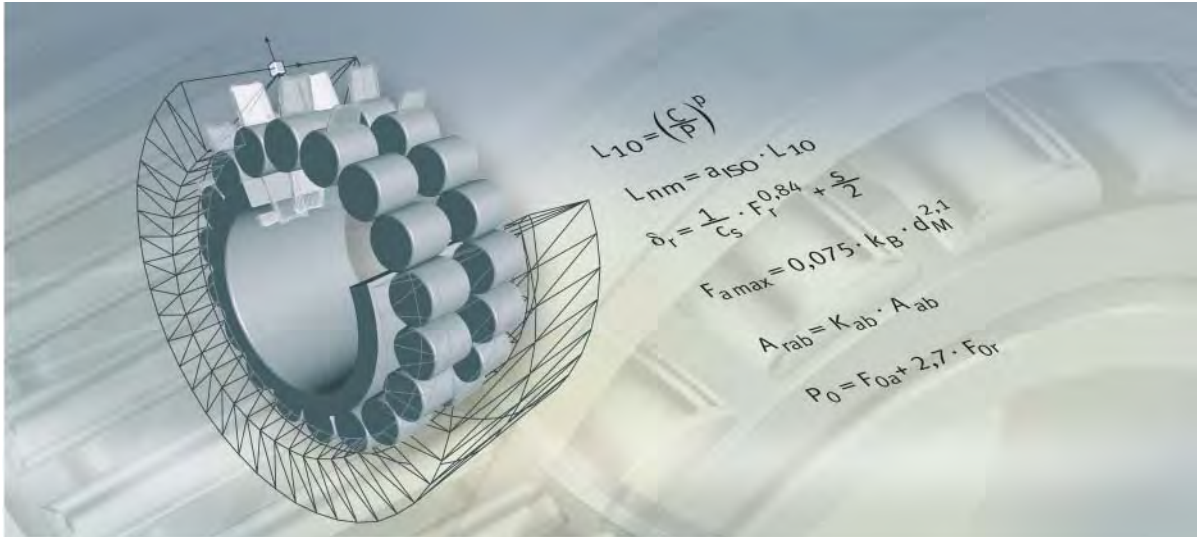


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## Spherical roller bearings



**FAG**



## Technical principles

Load carrying capacity and life

Rigidity

Friction and increases in temperature

Speeds

Lubrication

Bearing data

Design of bearing arrangements

Mounting and dismounting



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# Load carrying capacity and life

Schaeffler introduced the “Expanded calculation of the adjusted rating life” in 1997. This method was standardised for the first time in DIN ISO 281 Appendix 1 and has been a constituent part of the international standard ISO 281 since 2007.

As part of the international standardisation work, the life adjustment factor  $a_{DIN}$  was renamed as  $a_{ISO}$  but without any change to the calculation method.

## Fatigue theory as a principle

The basis of the rating life calculation in accordance with ISO 281 is Lundberg and Palmgren’s fatigue theory which always gives a final rating life.

However, modern, high quality bearings can exceed by a considerable margin the values calculated for the basic rating life under favourable operating conditions. Ioannides and Harris have developed a further model of fatigue in rolling contact that expands on the theory by Lundberg and Palmgren and gives a better description of the performance capability of modern bearings.

The method “Expanded calculation of the adjusted rating life” takes account of the following influences:

- the bearing load
- the fatigue limit of the material
- the extent to which the surfaces are separated by the lubricant
- the cleanliness in the lubrication gap
- additives in the lubricant
- the internal load distribution and frictional conditions in the bearing.



The influencing factors, particularly those relating to contamination, are very complex. A great deal of experience is required in order to arrive at an accurate assessment. Further advice should therefore be sought from the engineering service of Schaeffler Technologies.

The tables and diagrams can give only guide values.





## Dimensioning of rolling bearings

The required size of a rolling bearing is dependent on the demands made on its:

- rating life
- load carrying capacity
- operational reliability.

## Dynamic load carrying capacity and life

The dynamic load carrying capacity is described in terms of the basic dynamic load ratings. The basic dynamic load ratings are based on DIN ISO 281.

The basic dynamic load ratings for rolling bearings are matched to empirically proven performance standards and published in previous FAG and INA catalogues.

The fatigue behaviour of the material determines the dynamic load carrying capacity of the rolling bearing.

The dynamic load carrying capacity is described in terms of the basic dynamic load rating and the basic rating life.

The fatigue life is dependent on:

- the load
- the operating speed
- the statistical probability of the first appearance of failure.

For rotating rolling bearings, the decisive parameter is the basic dynamic load rating  $C$ .

This is:

- a constant radial load  $C_r$  for radial bearings
- a constant, concentrically acting axial load  $C_a$  for axial bearings.

The basic dynamic load rating  $C$  is that load of constant magnitude and direction which a sufficiently large number of apparently identical bearings can endure for a basic rating life of one million revolutions.

## Calculation of the rating life

The methods for calculating the rating life are:

- the basic rating life  $L_{10}$  and  $L_{10h}$  to ISO 281, see section Basic rating life, page 32
- the adjusted rating life  $L_{na}$  to DIN ISO 281:1990 (no longer a constituent part of ISO 281), see section Adjusted rating life, page 33
- the expanded adjusted rating life  $L_{nm}$  to ISO 281, see section Expanded adjusted rating life, page 36.

# Load carrying capacity and life

## Basic rating life

The basic rating life  $L_{10}$  and  $L_{10h}$  is determined as follows:

$$L_{10} = \left( \frac{C}{P} \right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left( \frac{C}{P} \right)^p$$

$L_{10}$   $10^6$  revolutions

The basic rating life in millions of revolutions that is reached or exceeded by 90% of a sufficiently large group of apparently identical bearings before the first evidence of material fatigue develops

$L_{10h}$  h

The basic rating life in operating hours according to the definition for  $L_{10}$

C N

Basic dynamic load rating

P N

Equivalent dynamic bearing load for radial and axial bearings

p -

Life exponent;

for roller bearings:  $p = 10/3$

for ball bearings:  $p = 3$

n  $\text{min}^{-1}$

Operating speed.

## Equivalent dynamic bearing load

The equivalent dynamic load P is a calculated value.

This value is constant in magnitude and direction; it is a radial load for radial bearings and an axial load for axial bearings.

P gives the same rating life as the combined load occurring in practice.

$$P = X \cdot F_r + Y \cdot F_a$$

P N

Equivalent dynamic bearing load

$F_r$  N

Radial dynamic bearing load

$F_a$  N

Axial dynamic bearing load

X -

Radial factor given in the dimension tables or product description

Y -

Axial factor given in the dimension tables or product description.



This calculation method cannot be applied to axial cylindrical roller bearings. Combined loads are not permissible with these bearings.



## Adjusted rating life

The adjusted rating life  $L_{na}$  can be calculated if, in addition to the load and speed, other influences are known such as:

- special material characteristics
- lubrication
- a requisite reliability other than 90%.

This calculation method was replaced in ISO 281:2007 by calculation of the expanded adjusted rating life  $L_{nm}$ , see page 36.

$$L_{na} = a_1 \cdot a_2 \cdot a_3 \cdot L_{10}$$

$L_{na}$   $10^6$  revolutions  
Adjusted rating life for special material characteristics and operating conditions with a requisite reliability of  $(100 - n) \%$

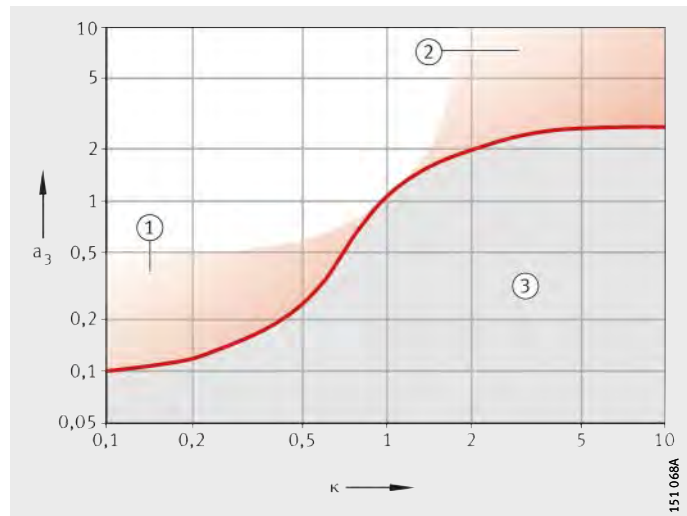
$L_{10}$   $10^6$  revolutions  
Basic rating life

$a_1$  –  
Life adjustment factor for a requisite reliability other than 90%.  
In ISO 281:2007, the values for the life adjustment factor  $a_1$  were redefined, see table Life adjustment factor  $a_1$  for requisite reliability, page 36

$a_2$  –  
Life adjustment factor for special material characteristics.  
For standard rolling bearing steels:  $a_2 = 1$

$a_3$  –  
Life adjustment factor for special operating conditions;  
in particular lubrication, *Figure 1*.

The viscosity ratio  $\kappa$  is determined according to the equation on page 34.



$a_3$  = life adjustment factor  
 $\kappa$  = viscosity ratio

- ① Good cleanliness and suitable additives
- ② Very high cleanliness and low load
- ③ Contamination in the lubricant

*Figure 1*  
Life adjustment factor  $a_3$

# Load carrying capacity and life

**Viscosity ratio** The viscosity ratio  $\kappa$  is an indication of the quality of lubricant film formation:

$$\kappa = \frac{\nu}{\nu_1}$$

$\nu$   $\text{mm}^2\text{s}^{-1}$   
Kinematic viscosity of the lubricant at operating temperature  
 $\nu_1$   $\text{mm}^2\text{s}^{-1}$   
Reference viscosity of the lubricant at operating temperature.

The reference viscosity  $\nu_1$  is determined from the mean bearing diameter  $d_M = (D + d)/2$  and the operating speed  $n$ , *Figure 2*, page 35.

The nominal viscosity of the oil at +40 °C is determined from the required operating viscosity  $\nu$  and the operating temperature  $\vartheta$ , *Figure 3*, page 35. In the case of greases,  $\nu$  is the operating viscosity of the base oil.

In the case of heavily loaded bearings with a high proportion of sliding contact, the temperature in the contact area of the rolling elements may be up to 20 K higher than the temperature measured on the stationary ring (without the influence of any external heat sources).

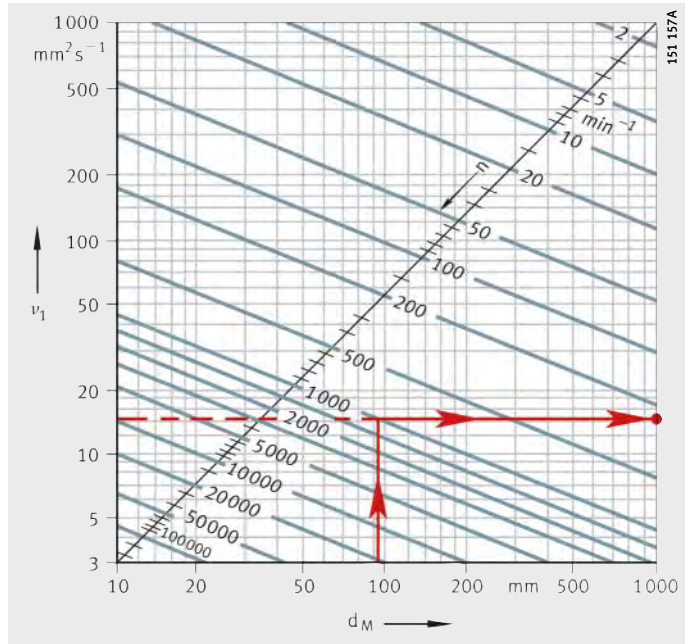


Taking account of EP additives in calculation of the expanded adjusted rating life  $L_{nm}$ : see page 36.



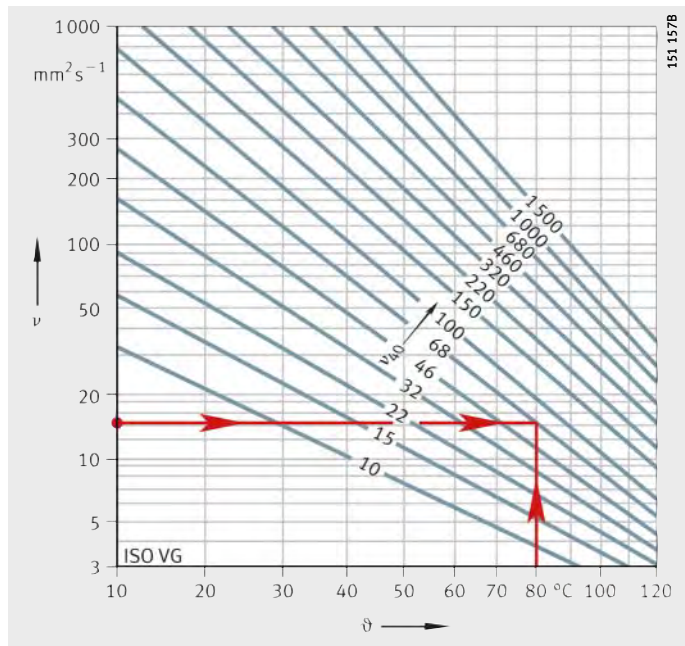
$\nu_1$  = reference viscosity  
 $d_M$  = mean bearing diameter  
 $n$  = speed

Figure 2  
 Reference viscosity  $\nu_1$



$\nu$  = operating viscosity  
 $\vartheta$  = operating temperature  
 $\nu_{40}$  = viscosity at +40 °C

Figure 3  
 V/T diagram for mineral oils



# Load carrying capacity and life

## Expanded adjusted rating life

The calculation of the expanded adjusted rating life  $L_{nm}$  was standardised in DIN ISO 281 Appendix 1. Since 2007, it has been standardised in the worldwide standard ISO 281. Computer-aided calculation in accordance with DIN ISO 281 Appendix 4 has been specified in ISO/TS 16 281 since 2008.

$L_{nm}$  is calculated as follows:

$$L_{nm} = a_1 \cdot a_{ISO} \cdot L_{10}$$

$L_{nm}$  10<sup>6</sup> revolutions

Expanded adjusted rating life in 10<sup>6</sup> revolutions to ISO 281

$a_1$  –

Life adjustment factor for a requisite reliability other than 90%, see table

$a_{ISO}$  –

Life adjustment factor for operating conditions

$L_{10}$  10<sup>6</sup> revolutions

Basic rating life, see page 32.

The values for the life adjustment factor  $a_1$  were redefined in ISO 281:2007 and differ from the previous data.

## Life adjustment factor $a_1$ for requisite reliability

| Requisite reliability<br>% | Expanded<br>adjusted rating life<br>$L_{nm}$ | Life adjustment factor<br>$a_1$ |
|----------------------------|--|---------------------------------|
| 90                         | $L_{10m}$                                    | 1                               |
| 95                         | $L_{5m}$                                     | 0,64                            |
| 96                         | $L_{4m}$                                     | 0,55                            |
| 97                         | $L_{3m}$                                     | 0,47                            |
| 98                         | $L_{2m}$                                     | 0,37                            |
| 99                         | $L_{1m}$                                     | 0,25                            |
| 99,2                       | $L_{0,8m}$                                   | 0,22                            |
| 99,4                       | $L_{0,6m}$                                   | 0,19                            |
| 99,6                       | $L_{0,4m}$                                   | 0,16                            |
| 99,8                       | $L_{0,2m}$                                   | 0,12                            |
| 99,9                       | $L_{0,1m}$                                   | 0,093                           |
| 99,92                      | $L_{0,08m}$                                  | 0,087                           |
| 99,94                      | $L_{0,06m}$                                  | 0,08                            |
| 99,95                      | $L_{0,05m}$                                  | 0,077                           |



### Life adjustment factor $a_{ISO}$ for operating conditions

The standardised method for calculating the life adjustment factor  $a_{ISO}$  essentially takes account of:

- the load on the bearing
- the lubrication conditions (viscosity and type of lubricant, speed, bearing size, additives)
- the fatigue limit of the material
- the type of bearing
- the residual stress in the material
- the environmental conditions
- contamination in the lubricant.

$$a_{ISO} = f \left[ \frac{e_c \cdot C_u}{P}, \kappa \right]$$

$a_{ISO}$  – Life adjustment factor for operating conditions, Figure 4, page 38 to Figure 7, page 39

$e_c$  – Life adjustment factor for contamination, see table, page 40

$C_u$  – Fatigue limit load

$P$  – Equivalent dynamic bearing load

$\kappa$  – Viscosity ratio, see page 34.

For  $\kappa > 4$  a value  $\kappa = 4$  should be expected.

This calculation method cannot be used for  $\kappa < 0,1$ .

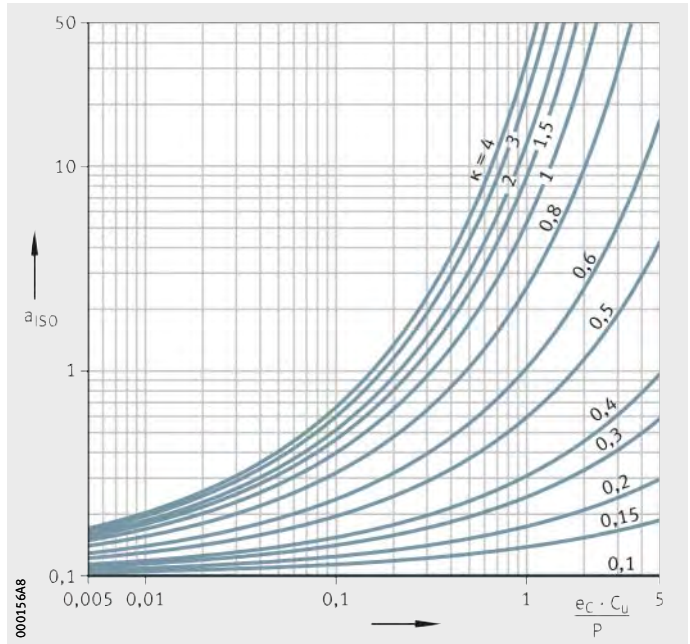
### Taking account of EP additives in the lubricant

In accordance with ISO 281, EP additives in the lubricant can be taken into consideration as follows:

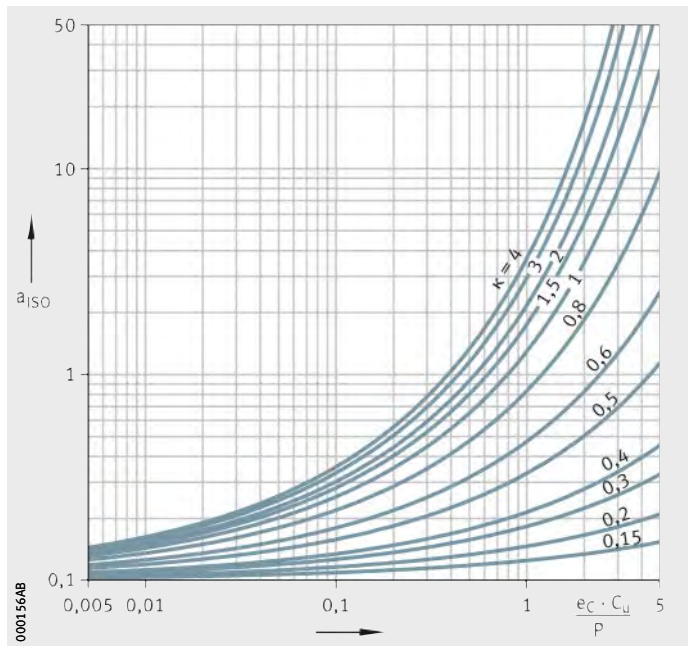
- At a viscosity ratio  $\kappa < 1$  and a contamination factor  $e_c \geq 0,2$ , a value  $\kappa = 1$  can be used in calculation in the case of lubricants with EP additives that have proven effective. Under severe contamination (contamination factor  $e_c < 0,2$ ), the effectiveness of the additives under these contamination conditions must be proven. The effectiveness of the EP additives can be demonstrated in the actual application or on a rolling bearing test rig FE 8 to DIN 51 819-1.

Where a value  $\kappa = 1$  is used in calculation in the case of EP additives that have proven effective, the life adjustment factor must be restricted to  $a_{ISO} \leq 3$ . If the value  $a_{ISO}$  calculated for the actual  $\kappa$  is greater than 3, this value can be used in calculation.

# Load carrying capacity and life



*Figure 4*  
Life adjustment factor  $a_{ISO}$   
for radial roller bearings



*Figure 5*  
Life adjustment factor  $a_{ISO}$   
for axial roller bearings



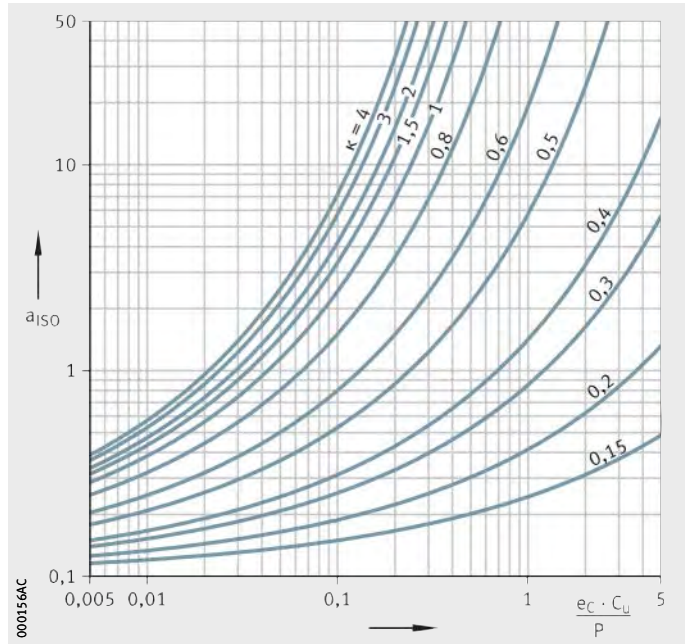


Figure 6  
Life adjustment factor  $a_{150}$   
for radial ball bearings

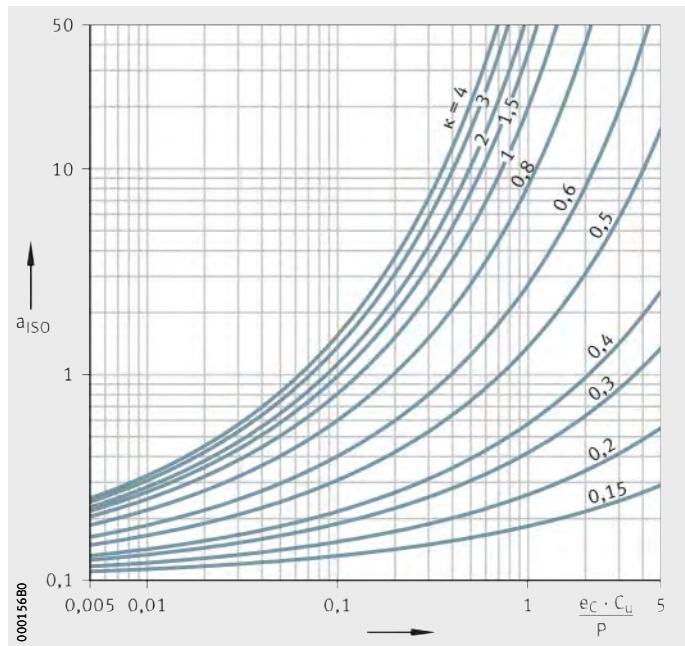


Figure 7  
Life adjustment factor  $a_{150}$   
for axial ball bearings

# Load carrying capacity and life

## Fatigue limit load

The fatigue limit load  $C_U$  in accordance with ISO 281 is defined as the load below which, under laboratory conditions, no fatigue occurs in the material.

## Life adjustment factor for contamination

The life adjustment factor for contamination  $e_C$  takes account of the influence of contamination in the lubrication gap on the rating life, see table.

The rating life is reduced by solid particles in the lubrication gap and is dependent on:

- the type, size, hardness and quantity of particles
- the relative lubricant film thickness
- the bearing size.

Due to the complex nature of the interaction between these influencing factors, only an approximate guide value can be attained. The values in the tables are valid for contamination by solid particles (factor  $e_C$ ). They do not take account of other contamination such as that caused by water or other fluids.



Under severe contamination ( $e_C \rightarrow 0$ ), the bearings may fail due to wear. In this case, the operating life is substantially less than the calculated life.

## Factor $e_C$ for contamination

| Contamination   | Factor $e_C$             |                             |
|---|--------------------------|-----------------------------|
|   | $d_M < 100 \text{ mm}^1$ | $d_M \geq 100 \text{ mm}^1$ |
| Extreme cleanliness<br>■ particle size of the order of magnitude of the lubricant film thickness<br>■ laboratory conditions | 1                        | 1                           |
| High cleanliness<br>■ oil filtered through extremely fine filter<br>■ sealed, greased bearings                              | 0,8 to 0,6               | 0,9 to 0,8                  |
| Standard cleanliness<br>■ oil filtered through fine filter  | 0,6 to 0,5               | 0,8 to 0,6                  |
| Slight contamination<br>■ slight contamination of oil   | 0,5 to 0,3               | 0,6 to 0,4                  |
| Typical contamination<br>■ bearing contaminated with wear debris from other machine elements                                | 0,3 to 0,1               | 0,4 to 0,2                  |
| Heavy contamination<br>■ bearing environment heavily contaminated<br>■ bearing arrangement insufficiently sealed            | 0,1 to 0                 | 0,1 to 0                    |
| Very heavy contamination  | 0                        | 0                           |

<sup>1)</sup>  $d_M$  = mean bearing diameter  $(d + D)/2$ .



### Equivalent operating values

The rating life equations are based on the assumption that the bearing load P and bearing speed n are constant. If the load and speed are not constant, equivalent operating values can be determined that induce the same fatigue as the actual conditions.



The operating values calculated here already take account of the life adjustment factors  $a_3$  or  $a_{ISO}$ . They must not be applied again when calculating the adjusted rating life.

### Variable load and speed

If the load and speed vary over a time period T, the speed n and equivalent bearing load P are calculated as follows:

$$n = \frac{1}{T} \int_0^T n(t) \cdot dt$$

$$P = \sqrt[p]{\frac{\int_0^T \frac{1}{a(t)} \cdot n(t) \cdot F^p(t) \cdot dt}{\int_0^T n(t) \cdot dt}}$$

### Variation in steps

If the load and speed vary in steps over a time period T, n and P are calculated as follows:

$$n = \frac{q_1 \cdot n_1 + q_2 \cdot n_2 + \dots + q_z \cdot n_z}{100}$$

$$P = \sqrt[p]{\frac{\frac{1}{a_i} \cdot q_i \cdot n_i \cdot F_i^p + \dots + \frac{1}{a_z} \cdot q_z \cdot n_z \cdot F_z^p}{q_i \cdot n_i + \dots + q_z \cdot n_z}}$$

### Variable load at constant speed

If the function F describes the variation in the load over a time period T and the speed is constant, P is calculated as follows:

$$P = \sqrt[p]{\frac{1}{T} \int_0^T \frac{1}{a(t)} \cdot F^p(t) \cdot dt}$$

### Load varying in steps and constant speed

If the load varies in steps over a time period T and the speed is constant, P is calculated as follows:

$$P = \sqrt[p]{\frac{\frac{1}{a_i} \cdot q_i \cdot F_i^p + \dots + \frac{1}{a_z} \cdot q_z \cdot F_z^p}{100}}$$

### Constant load at variable speed

If the speed varies but the load remains constant, the following applies:

$$n = \frac{1}{T} \int_0^T \frac{1}{a(t)} \cdot n(t) \cdot dt$$

# Load carrying capacity and life

## Constant load with speed varying in steps

If the speed varies in steps, the following applies:

$$n = \frac{\frac{1}{a_i} \cdot q_i \cdot n_i + \dots + \frac{1}{a_z} \cdot q_z \cdot n_z}{100}$$

## Oscillating bearing motion

The equivalent speed is calculated as follows:

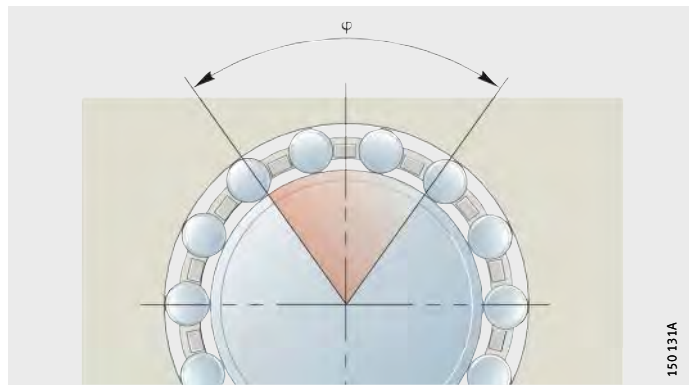
$$n = n_{osc} \cdot \frac{\varphi}{180^\circ}$$



The equation is valid only if the angle of oscillation is greater than twice the angular pitch of the rolling elements. If the angle of oscillation is smaller, there is a risk of false brinelling.

$\varphi$  = angle of oscillation

*Figure 8*  
Angle of oscillation



## Symbols, units and definitions

|  |                   |
|--|-------------------|
| $n$  | $\text{min}^{-1}$ |
| Mean speed   |                   |
| $T$  | $\text{min}$      |
| Time period under consideration  |                   |
| $P$  | $N$               |
| Equivalent bearing load  |                   |
| $p$  | $-$               |
| Life exponent;   |                   |
| for roller bearings: $p = 10/3$  |                   |
| for ball bearings: $p = 3$   |                   |
| $a_i, a(t)$  | $-$               |
| Life adjustment factor $a_{i50}$ for current operating condition, see page 37  |                   |
| $n_i, n(t)$  | $\text{min}^{-1}$ |
| Bearing speed during current operating condition                               |                   |
| $q_i$  | $\%$              |
| Duration of operating condition as a proportion of the total operating period; |                   |
| $q_i = (\Delta t_i / T) \cdot 100$   |                   |
| $F_i, F(t)$  | $N$               |
| Bearing load during current operating condition                                |                   |
| $n_{osc}$  | $\text{min}^{-1}$ |
| Frequency of to and fro movement   |                   |
| $\varphi$  | $^\circ$          |
| Angle of oscillation, <i>Figure 8</i> .  |                   |



## Required rating life

If no information is available on the rating life, the guide values from the following tables may be used.



Do not overspecify the bearing. If the calculated rating life is > 60 000 h, this normally means that the bearing arrangement is overspecified. Pay attention to the minimum load for the bearings; see the Design and safety guidelines in the product sections.

### Rail vehicles

| Mounting location           | Recommended rating life in h |        |                 |        |
|-----------------------------|------------------------------|--------|-----------------|--------|
|                             | Ball bearings                |        | Roller bearings |        |
|                             | from                         | to     | from            | to     |
| Gearboxes for rail vehicles | 14 000                       | 46 000 | 20 000          | 75 000 |

### Shipbuilding

| Mounting location      | Recommended rating life in h |        |                 |         |
|------------------------|------------------------------|--------|-----------------|---------|
|                        | Ball bearings                |        | Roller bearings |         |
|                        | from                         | to     | from            | to      |
| Marine thrust blocks   | –                            | –      | 20 000          | 50 000  |
| Marine shaft bearings  | –                            | –      | 50 000          | 200 000 |
| Large marine gearboxes | 14 000                       | 46 000 | 20 000          | 75 000  |

### Electric motors

| Mounting location | Recommended rating life in h |        |                 |         |
|-------------------|------------------------------|--------|-----------------|---------|
|                   | Ball bearings                |        | Roller bearings |         |
|                   | from                         | to     | from            | to      |
| Large motors      | 32 000                       | 63 000 | 50 000          | 110 000 |

### Rolling mills, steelworks equipment

| Mounting location            | Recommended rating life in h |        |                 |        |
|------------------------------|------------------------------|--------|-----------------|--------|
|                              | Ball bearings                |        | Roller bearings |        |
|                              | from                         | to     | from            | to     |
| Roll stands                  | 500                          | 14 000 | 500             | 20 000 |
| Rolling mill gearboxes       | 14 000                       | 32 000 | 20 000          | 50 000 |
| Roller tables                | 7 800                        | 21 000 | 10 000          | 35 000 |
| Centrifugal casting machines | 21 000                       | 46 000 | 35 000          | 75 000 |

### Machine tools

| Mounting location                       | Recommended rating life in h |        |                 |         |
|---|------------------------------|--------|-----------------|---------|
|   | Ball bearings                |        | Roller bearings |         |
|   | from                         | to     | from            | to      |
| Headstock spindles, milling spindles    | 14 000                       | 46 000 | 20 000          | 75 000  |
| Drilling spindles                       | 14 000                       | 32 000 | 20 000          | 50 000  |
| Grinding spindles                       | 7 800                        | 21 000 | 10 000          | 35 000  |
| Workpiece spindles in grinding machines | 21 000                       | 63 000 | 35 000          | 110 000 |
| Machine tool gearboxes                  | 14 000                       | 32 000 | 20 000          | 50 000  |
| Presses, flywheels                      | 21 000                       | 32 000 | 35 000          | 50 000  |
| Presses, eccentric shafts               | 14 000                       | 21 000 | 20 000          | 35 000  |

## Load carrying capacity and life

### Gearboxes in general machine building

| Mounting location           | Recommended rating life in h |        |                 |        |
|-----------------------------|------------------------------|--------|-----------------|--------|
|                             | Ball bearings                |        | Roller bearings |        |
|                             | from                         | to     | from            | to     |
| Large gearboxes, stationary | 14 000                       | 46 000 | 20 000          | 75 000 |

### Conveying equipment

| Mounting location                              | Recommended rating life in h |        |                 |         |
|--|------------------------------|--------|-----------------|---------|
|  | Ball bearings                |        | Roller bearings |         |
|  | from                         | to     | from            | to      |
| Belt drives, mining                            | –                            | –      | 75 000          | 150 000 |
| Conveyor belt rollers, mining                  | 46 000                       | 63 000 | 75 000          | 110 000 |
| Belt drums                                     | –                            | –      | 50 000          | 75 000  |
| Bucket wheel excavators,<br>travel drive       | 7 800                        | 21 000 | 10 000          | 35 000  |
| Bucket wheel excavators,<br>bucket wheel       | –                            | –      | 75 000          | 200 000 |
| Bucket wheel excavators,<br>bucket wheel drive | 46 000                       | 83 000 | 75 000          | 150 000 |
| Winding cable sheaves                          | 32 000                       | 46 000 | 50 000          | 75 000  |
| Sheaves  | 7 800                        | 21 000 | 10 000          | 35 000  |

### Pumps, fans, compressors

| Mounting location | Recommended rating life in h |        |                 |         |
|-------------------|------------------------------|--------|-----------------|---------|
|                   | Ball bearings                |        | Roller bearings |         |
|                   | from                         | to     | from            | to      |
| Ventilators, fans | 21 000                       | 46 000 | 35 000          | 75 000  |
| Large fans        | 32 000                       | 63 000 | 50 000          | 110 000 |

### Centrifuges, stirrers

| Mounting location | Recommended rating life in h |        |                 |        |
|-------------------|------------------------------|--------|-----------------|--------|
|                   | Ball bearings                |        | Roller bearings |        |
|                   | from                         | to     | from            | to     |
| Centrifuges       | 7 800                        | 14 000 | 10 000          | 20 000 |
| Large stirrers    | 21 000                       | 32 000 | 35 000          | 50 000 |

### Plastics processing

| Mounting location             | Recommended rating life in h |        |                 |        |
|-------------------------------|------------------------------|--------|-----------------|--------|
|                               | Ball bearings                |        | Roller bearings |        |
|                               | from                         | to     | from            | to     |
| Plastics worm extruders       | 14 000                       | 21 000 | 20 000          | 35 000 |
| Rubber and plastics calendars | 21 000                       | 46 000 | 35 000          | 75 000 |



### Crushers, mills, screens

| Mounting location                                 | Recommended rating life in h |    |                 |         |
|---|------------------------------|----|-----------------|---------|
|   | Ball bearings                |    | Roller bearings |         |
|   | from                         | to | from            | to      |
| Jaw crushers                                      | –                            | –  | 20 000          | 35 000  |
| Gyratory crushers, roll crushers                  | –                            | –  | 20 000          | 35 000  |
| Rigid hammer mills, hammer mills, impact crushers | –                            | –  | 50 000          | 110 000 |
| Tube mills  | –                            | –  | 50 000          | 100 000 |
| Vibration grinding mills                          | –                            | –  | 5 000           | 20 000  |
| Grinding track mills                              | –                            | –  | 50 000          | 110 000 |
| Vibrating screens                                 | –                            | –  | 10 000          | 20 000  |
| Briquette presses                                 | –                            | –  | 35 000          | 50 000  |
| Rotary furnace track rollers                      | –                            | –  | 50 000          | 110 000 |

### Paper and printing machinery

| Mounting location                    | Recommended rating life in h |        |                 |         |
|--------------------------------------|------------------------------|--------|-----------------|---------|
|                                      | Ball bearings                |        | Roller bearings |         |
|                                      | from                         | to     | from            | to      |
| Paper machinery, material processing | –                            | –      | 80 000          | 120 000 |
| Paper machinery, wet section         | –                            | –      | 100 000         | 150 000 |
| Paper machinery, dry section         | –                            | –      | 120 000         | 250 000 |
| Paper machinery, calenders           | –                            | –      | 80 000          | 120 000 |
| Printing machinery                   | 32 000                       | 46 000 | 50 000          | 75 000  |

### Operating life

The operating life is defined as the life actually achieved by the bearing. It may differ significantly from the calculated value.

This may be due to wear or fatigue as a result of:

- deviations in the operating data
- misalignment between the shaft and housing
- insufficient or excessive operating clearance
- contamination
- insufficient lubrication
- excessive operating temperature
- oscillating bearing movement with very small angles of oscillation (false brinelling)
- high vibration loads and false brinelling
- very high shock loads (static overloading)
- prior damage during installation.



Due to the wide variety of possible installation and operating conditions, it is not possible to precisely predetermine the operating life. The most reliable way of arriving at a close estimate is by comparison with similar applications.

# Load carrying capacity and life

## Axial load carrying capacity of cylindrical roller bearings

Radial cylindrical roller bearings used as semi-locating and locating bearings can support axial forces in one or both directions in addition to radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- the tilting of the bearing.



Ribs subjected to load must be supported across their entire height.

The permissible axial load  $F_{a\text{ per}}$  must not be exceeded, in order to avoid impermissibly high temperatures.

The limiting load  $F_{a\text{ max}}$  must not be exceeded, in order to avoid unacceptable pressure at the contact surfaces.

The ratio  $F_a/F_r$  must not exceed the value 0,4.

For bearings of the TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

## Bearings of TB design

In the case of these bearings, the axial load carrying capacity has been significantly improved through the use of new calculation and manufacturing methods.

A special curvature on the end faces of the rollers ensures optimum contact conditions between the roller and rib.

As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated. The axial frictional torque is reduced by up to 50%.

The bearing temperature during operation is therefore significantly lower.





## Permissible and maximum axial load

$F_{a\text{ per}}$  and  $F_{a\text{ max}}$  are calculated using the following equations.

### Bearings of standard design

$$F_{a\text{ per}} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \cong F_{a\text{ max}}$$

### Bearings of TB design

$$F_{a\text{ per}} = 1,5 \cdot k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \cong F_{a\text{ max}}$$

### Bearings of standard and TB design

$$F_{a\text{ max}} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\text{ per}}$  N  
Permissible axial load

$F_{a\text{ max}}$  N  
Axial limiting load

$k_S$  –  
Factor dependent on the lubrication method,  
see table Factor  $k_S$  for the lubrication method, page 48

$k_B$  –  
Factor dependent on the bearing series,  
see table Bearing factor  $k_B$ , page 48

$d_M$  mm  
Mean bearing diameter  $(d + D)/2$

$n$   $\text{min}^{-1}$   
Operating speed.

# Load carrying capacity and life

## Misalignment of bearings



Misalignment caused by shaft deflection, for example, may lead to alternating stresses on the inner ring ribs. In this case, axial loading through to bearing tilting of max. 2 angular minutes must be restricted to  $F_{as}$  in accordance with the equation.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If more severe tilting is present, a separate strength analysis is required.

## Factor $k_S$ for the lubrication method

| Lubrication method <sup>1)</sup>   | Factor $k_S$ |
|--|--------------|
| Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ( $\nu < 0,5 \cdot \nu_1$ ) | 7,5 to 10    |
| Little heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow   | 10 to 15     |
| Good heat dissipation, recirculating oil lubrication (pressure oil lubrication)  | 12 to 18     |
| Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ( $\nu > 2 \cdot \nu_1$ ) | 16 to 24     |

<sup>1)</sup> The precondition for these  $k_S$  values is a reference viscosity  $\nu_1$  in accordance with the section Oil lubrication, page 85. Doped oils should be used such as CLP (DIN 51 517) and HLP (DIN 51 524) of ISO VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

## Bearing factor $k_B$

| Series                                 | Factor $k_B$ |
|--|--------------|
| SL1818, SL0148                         | 4,5          |
| SL1829, SL0149                         | 11           |
| SL1830, SL1850                         | 17           |
| SL1822                                 | 20           |
| LSL1923, ZSL1923                       | 28           |
| SL1923                                 | 30           |
| NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E | 15           |
| NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E | 20           |
| NJ4                                    | 22           |



### Static load carrying capacity

Very high static loads or shock loads can cause plastic deformation on the raceways and rolling elements. This deformation limits the static load carrying capacity of the rolling bearing with respect to the permissible noise level during operation of the bearing.

If a rolling bearing operates with only infrequent rotary motion or completely without rotary motion, its size is determined in accordance with the basic static load rating  $C_0$ .

According to DIN ISO 76, this is:

- a constant radial load  $C_{0r}$  for radial bearings
- a concentrically acting, constant axial load  $C_{0a}$  for axial bearings.

The basic static load rating  $C_0$  is that load under which the Hertzian pressure at the most heavily loaded point between the rolling elements and raceways reaches the following values:

- for roller bearings, 4 000 N/mm<sup>2</sup>
- for ball bearings, 4 200 N/mm<sup>2</sup>
- for self-aligning ball bearings, 4 600 N/mm<sup>2</sup>.

Under normal contact conditions, this load causes a permanent deformation at the contact points of approx. 1/10 000 of the rolling element diameter.

### Static load safety factor



In addition to dimensioning on the basis of the fatigue limit life, it is advisable to check the static load safety factor. The guide values and shock loads occurring in operation according to the table must be taken into consideration, see table Guide values for static load safety factor, page 50.

The static load safety factor  $S_0$  is the ratio between the basic static load rating  $C_0$  and the equivalent static load  $P_0$ :

$$S_0 = \frac{C_0}{P_0}$$

$S_0$  – Static load safety factor

$C_0$  ( $C_{0r}$ ,  $C_{0a}$ ) – N  
Basic static load rating

$P_0$  ( $P_{0r}$ ,  $P_{0a}$ ) – N  
Equivalent static load on the radial or axial bearing, see page 50.



Guide values for axial spherical roller bearings and high precision bearings: see corresponding product description.

# Load carrying capacity and life

## Guide values for static load safety factor

| Operating conditions  | Static load safety factor $S_0$ |               |
|---|---------------------------------|---------------|
|   | Roller bearings                 | Ball bearings |
| Smooth, low-vibration, normal operation with minimal demands for smooth running; bearings with slight rotary motion | $\geq 1$                        | $\geq 0,5$    |
| Normal operation with higher requirements for smooth running  | $\geq 2$                        | $\geq 1$      |
| Operation with pronounced shock loads   | $\geq 3$                        | $\geq 2$      |
| Bearing arrangement with high requirements for running accuracy and smooth running                                  | $\geq 4$                        | $\geq 3$      |

## Equivalent static load

The equivalent static load  $P_0$  is a calculated value. It corresponds to a radial load in radial bearings and a concentric axial load in axial bearings.

$P_0$  induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined load occurring in practice.

$$P_0 = X_0 \cdot F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$  N  
Equivalent static bearing load

$F_{0r}$  N  
Radial static bearing load

$F_{0a}$  N  
Axial static bearing load

$X_0$  –  
Radial factor given in the dimension tables or product description

$Y_0$  –  
Axial factor given in the dimension tables or product description.

–  
Radial factor given in the dimension tables or product description

–  
Axial factor given in the dimension tables or product description.

–  
Axial factor given in the dimension tables or product description.



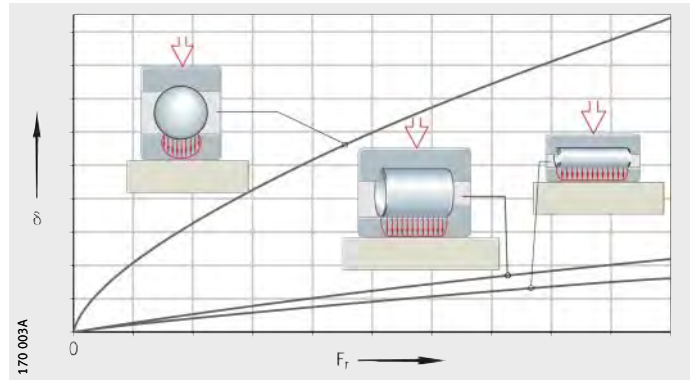
This calculation method cannot be applied to axial cylindrical roller bearings. Combined loads are not permissible with these bearings.

For all radial cylindrical roller bearings,  $P_0 = F_{0r}$ .



# Rigidity

The rigidity is determined by the type, size and operating clearance of the bearing. It increases with the number of rolling elements supporting the load. Rolling bearings with line contact have a higher rigidity than rolling bearings with point contact, *Figure 1*.



$\delta$  = displacement  
 $F_r$  = radial bearing load

*Figure 1*  
 Rigidity,  
 dependent on the bearing type

## Deflection

Rolling bearings have a progressive deflection rate. The displacement values can be determined using approximation equations.



The equations are valid for bearings without misalignment and with a rigid surrounding structure. In axial bearings, a concentrically acting load is assumed.

$$\delta_r = \frac{1}{c_s} \cdot F_r^{0,84} + \frac{s}{2}$$

$$\delta_a = \frac{1}{c_s} \cdot \left[ (F_{av} + F_a)^{0,84} - F_{av}^{0,84} \right]$$

$$c_s = K_c \cdot d^{0,65}$$

$c_s$   $N^{0,84}/\mu m$

Rigidity parameter

$d$  mm

Bearing bore diameter

$\delta_r$   $\mu m$

Radial displacement between shaft axis and bore centre,  
*Figure 2*, page 52

$\delta_a$   $\mu m$

Axial displacement between shaft locating washer and housing locating washer,  
*Figure 3*, page 52

$s$   $\mu m$

Radial operating clearance of mounted, unloaded bearing

$F_r$  N

Radial bearing load

$F_a$  N

Axial bearing load

$F_{av}$  N

Axial preload force

$K_c$  —

Factor for determining the rigidity parameter, see table, page 52.

# Rigidity

## Factor $K_c$

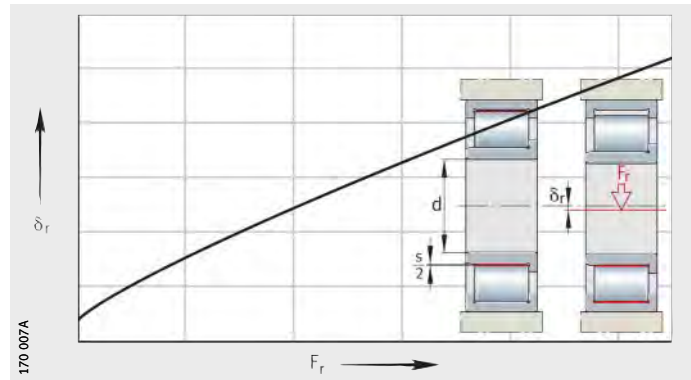
| Bearing series                 | Factor $K_c^{1)}$ | Bearing series | Factor $K_c^{1)}$ |
|--------------------------------|-------------------|----------------|-------------------|
| SL1818                         | 12,8              | NJ2...-E       | 11,1              |
| SL1829, SL1830, SL1923         | 16                | NJ3...-E       | 11,3              |
| SL1850, SL0148, SL0248, SL0249 | 29,2              | NJ22...-E      | 15,4              |
| K811, 811, K812, 812           | 36,7              | NJ23...-E      | 16,9              |
| K893, 893, K894, 894           | 59,7              | NU10           | 9,5               |
|                                |                   | NU19           | 11,3              |
|                                |                   | NN30...-AS-K   | 18,6              |

1)  $K_c$  values for other series available by agreement.

### Radial cylindrical roller bearing

$\delta_r$  = radial displacement  
 $F_r$  = radial bearing load

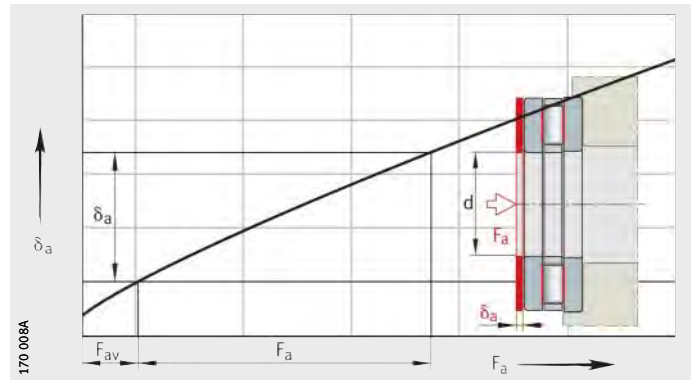
Figure 2  
 Radial displacement



### Axial cylindrical roller bearing

$\delta_a$  = axial displacement  
 $F_a$  = axial bearing load  
 $F_{av}$  = axial preload force

Figure 3  
 Axial displacement





# Friction and increases in temperature

**Friction** The friction in a rolling bearing is made up of several components, see table. Due to the large number of influencing factors, such as dynamics in speed and load, tilting and skewing resulting from installation, the actual frictional torques and frictional energy may deviate significantly from the calculated values. If the frictional torque is an important design criterion, please consult the Schaeffler Engineering Service.

**Frictional component and influencing factor**

| Frictional component   | Influencing factor   |
|--|--|
| Rolling friction   | Magnitude of load  |
| Sliding friction of rolling elements<br>Sliding friction of cage | Magnitude and direction of load<br>Speed and lubrication conditions,<br>running-in condition |
| Fluid friction<br>(flow resistance)                              | Type and speed<br>Type, quantity and operating viscosity<br>of lubricant                     |
| Seal friction  | Type and preload of seal   |

The idling friction is dependent on the lubricant quantity, speed, operating viscosity of the lubricant, seals and the running-in condition of the bearing.

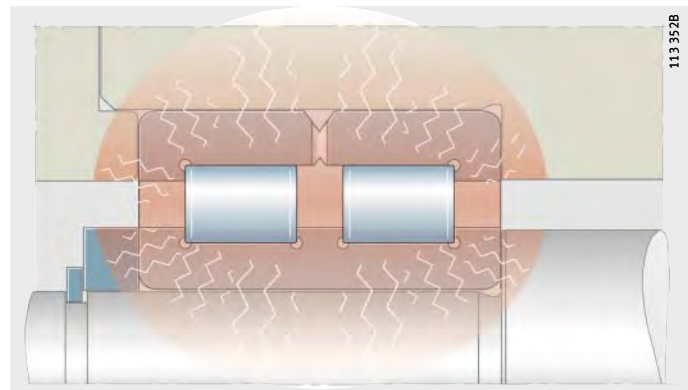
**Heat dissipation** Friction is converted into heat. This must be dissipated from the bearing. The equilibrium between the frictional energy and heat dissipation allows calculation of the thermally safe operating speed  $n_{\theta}$ , see section Thermally safe operating speed, page 61.

**Heat dissipation by the lubricant** Lubricating oil dissipates a portion of the heat. Recirculating oil lubrication with additional cooling is particularly effective. Grease does not give dissipation of heat.

**Heat dissipation via the shaft and housing** Heat dissipation via the shaft and housing is dependent on the temperature difference between the bearing and the surrounding structure, *Figure 1*.



Any additional adjacent sources of heat or thermal radiation must be taken into consideration.



*Figure 1*  
Temperature distribution between bearing, shaft and housing

# Friction and increases in temperature

## Determining the friction values

The speed and load must also be known. The type of lubrication, lubrication method and viscosity of lubricant at operating temperature are further important factors in calculation. Total frictional torque  $M_R$  (calculation of axially loaded cylindrical roller bearings, see page 58):

$$M_R = M_0 + M_1$$

Frictional energy  $N_R$ :

$$N_R = M_R \cdot \frac{n}{9550}$$

Frictional torque as a function of speed for  $v \cdot n \geq 2000$ :

$$M_0 = f_0 \cdot (v \cdot n)^{2/3} \cdot d_M^3 \cdot 10^{-7}$$

Frictional torque as a function of speed for  $v \cdot n < 2000$ :

$$M_0 = f_0 \cdot 160 \cdot d_M^3 \cdot 10^{-7}$$

Frictional torque as a function of load for cylindrical roller bearings:

$$M_1 = f_1 \cdot F \cdot d_M$$

Frictional torque as a function of load for ball bearings, tapered roller bearings and spherical roller bearings:

$$M_1 = f_1 \cdot P_1 \cdot d_M$$

|  |                                 |
|--|---------------------------------|
| $M_R$  | Nmm                             |
| Total frictional torque  |                                 |
| $M_0$  | Nmm                             |
| Frictional torque as a function of speed   |                                 |
| $M_1$  | Nmm                             |
| Frictional torque as a function of load  |                                 |
| $N_R$  | W                               |
| Frictional energy  |                                 |
| $n$  | min <sup>-1</sup>               |
| Operating speed  |                                 |
| $f_0$  | –                               |
| Bearing factor for frictional torque as a function of speed,<br><i>Figure 2</i> , page 55 and tables from page 55 to page 57                                       |                                 |
| $f_1$  | –                               |
| Bearing factor for frictional torque as a function of load,<br>see tables from page 55 to page 57  |                                 |
| $v$  | mm <sup>2</sup> s <sup>-1</sup> |
| Kinematic viscosity of lubricant at operating temperature.<br>In the case of grease, the decisive factor is the viscosity of the base oil at operating temperature |                                 |
| $F_r, F_a$   | N                               |
| Radial load for radial bearings, axial load for axial bearings   |                                 |
| $P_1$  | N                               |
| Decisive load for frictional torque.<br>For ball bearings, tapered roller bearings and spherical roller bearings,<br>see table, page 57                            |                                 |
| $d_M$  | mm                              |
| Mean bearing diameter $(d + D)/2$ .  |                                 |



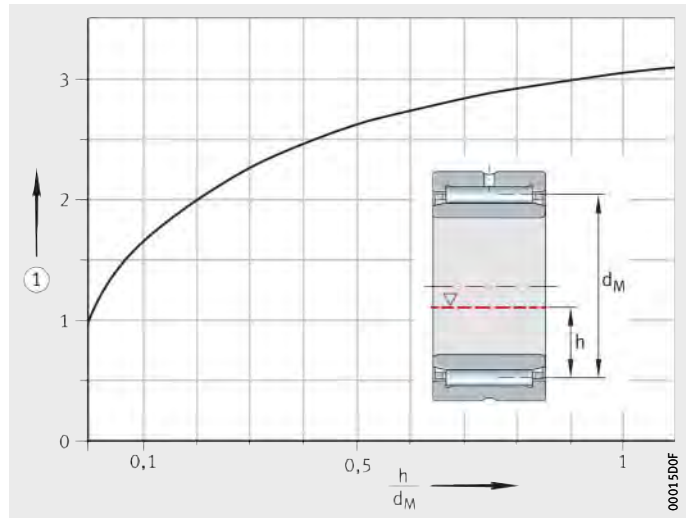


**Bearing factors**

The bearing factors  $f_0$  and  $f_1$  are mean values derived from series of tests and correspond to the data given in ISO 15 312.

They are valid for bearings that have undergone running-in and have uniform distribution of lubricant. In the freshly greased state, the bearing factor  $f_0$  can be two to five times higher.

If oil bath lubrication is used, the oil level must reach the centre of the lowest rolling element. If the oil level is higher,  $f_0$  may be up to 3 times the value given in the table, *Figure 2*.



① Increase factor for bearing factor  $f_0$   
 $h$  = oil level  
 $d_M$  = mean bearing diameter  $(d + D)/2$

*Figure 2*  
 Increase in the bearing factor  $f_0$ ,  
 as a function of the oil level

**Bearing factors  
 for cylindrical roller bearings,  
 full complement**

| Series         | Bearing factor $f_0$ |                             | Bearing factor $f_1$ |
|----------------|----------------------|-----------------------------|----------------------|
|                | Grease, oil mist     | Oil bath, recirculating oil |                      |
| SL1818         | 3                    | 5                           | 0,00055              |
| SL1829         | 4                    | 6                           |                      |
| SL1830         | 5                    | 7                           |                      |
| SL1822         | 5                    | 8                           |                      |
| SL0148, SL0248 | 6                    | 9                           |                      |
| SL0149, SL0249 | 7                    | 11                          |                      |
| SL1923         | 8                    | 12                          |                      |
| SL1850         | 9                    | 13                          |                      |

## Friction and increases in temperature

### Bearing factors for cylindrical roller bearings with cage

| Series  | Bearing factor $f_0$ |                             | Bearing factor $f_1$ |
|---------|----------------------|-----------------------------|----------------------|
|         | Grease, oil mist     | Oil bath, recirculating oil |                      |
| LSL1923 | 1                    | 3,7                         | 0,00020              |
| 2..-E   | 1,3                  | 2                           | 0,00030              |
| 3..-E   |                      |                             | 0,00035              |
| 4       |                      |                             | 0,00040              |
| 10, 19  |                      |                             | 0,00020              |
| 22..-E  | 2                    | 3                           | 0,00040              |
| 23..-E  | 2,7                  | 4                           | 0,00040              |
| 30      | 1,7                  | 2,5                         | 0,00040              |

### Bearing factors for axial roller bearings

| Series    | Bearing factor $f_0$ |                             | Bearing factor $f_1$ |
|-----------|----------------------|-----------------------------|----------------------|
|           | Grease, oil mist     | Oil bath, recirculating oil |                      |
| 811, K811 | 2                    | 3                           | 0,0015               |
| 812, K812 |                      |                             |                      |
| 893, K893 |                      |                             |                      |
| 894, K894 |                      |                             |                      |

### Bearing factors for tapered roller bearings

| Series                  | Bearing factor $f_0$ |                             | Bearing factor $f_1$ |
|-------------------------|----------------------|-----------------------------|----------------------|
|                         | Grease, oil mist     | Oil bath, recirculating oil |                      |
| 302, 303, 320, 329, 330 | 2                    | 3                           | 0,0004               |
| 313, 322, 323, 331, 332 | 3                    | 4,5                         |                      |

### Bearing factors for axial and radial spherical roller bearings

| Series   | Bearing factor $f_0$ |                             | Bearing factor $f_1$        |
|----------|----------------------|-----------------------------|-----------------------------|
|          | Grease, oil mist     | Oil bath, recirculating oil |                             |
| 213      | 2,3                  | 3,5                         | 0,0005 · $(P_0/C_0)^{0,33}$ |
| 222      | 2,7                  | 4                           |                             |
| 223      | 3                    | 4,5                         | 0,0008 · $(P_0/C_0)^{0,33}$ |
| 230, 239 |                      |                             | 0,00075 · $(P_0/C_0)^{0,5}$ |
| 231      | 3,7                  | 5,5                         | 0,0012 · $(P_0/C_0)^{0,5}$  |
| 232      | 4                    | 6                           | 0,0016 · $(P_0/C_0)^{0,5}$  |
| 240      | 4,3                  | 6,5                         | 0,0012 · $(P_0/C_0)^{0,5}$  |
| 241      | 4,7                  | 7                           | 0,0022 · $(P_0/C_0)^{0,5}$  |
| 292..-E  | 1,7                  | 2,5                         | 0,00023                     |
| 293..-E  | 2                    | 3                           | 0,00030                     |
| 294..-E  | 2,2                  | 3,3                         | 0,00033                     |



**Bearing factors  
for deep groove ball bearings**

| Series  | Bearing factor $f_0$ |                                | Bearing factor $f_1$           |
|---------|----------------------|--------------------------------|--------------------------------|
|         | Grease, oil mist     | Oil bath,<br>recirculating oil |                                |
| 618     | 1,1                  | 1,7                            | $0,0005 \cdot (P_0/C_0)^{0,5}$ |
| 160     | 1,1                  | 1,7                            | $0,0007 \cdot (P_0/C_0)^{0,5}$ |
| 60, 619 | 1,1                  | 1,7                            |                                |
| 62      | 1,3                  | 2                              | $0,0009 \cdot (P_0/C_0)^{0,5}$ |
| 63, 64  | 1,5                  | 2,3                            |                                |

**Bearing factors  
for angular contact ball bearings**

| Series | Bearing factor $f_0$ |                                | Bearing factor $f_1$           |
|--------|----------------------|--------------------------------|--------------------------------|
|        | Grease, oil mist     | Oil bath,<br>recirculating oil |                                |
| 70..-B | 1,3                  | 2                              | $0,001 \cdot (P_0/C_0)^{0,33}$ |
| 72..-B |                      | 3                              |                                |
| 73..-B | 2                    | 3                              |                                |

**Bearing factors  
for four point contact bearings**

| Series   | Bearing factor $f_0$ |                                | Bearing factor $f_1$           |
|----------|----------------------|--------------------------------|--------------------------------|
|          | Grease, oil mist     | Oil bath,<br>recirculating oil |                                |
| QJ2, QJ3 | 2,7                  | 4                              | $0,001 \cdot (P_0/C_0)^{0,33}$ |

**Bearing factors  
for axial deep groove ball bearings**

| Series                | Bearing factor $f_0$ |                                | Bearing factor $f_1$            |
|-----------------------|----------------------|--------------------------------|---------------------------------|
|                       | Grease, oil mist     | Oil bath,<br>recirculating oil |                                 |
| 511, 512, 513,<br>514 | 1                    | 1,5                            | $0,0012 \cdot (F_a/C_0)^{0,33}$ |

**Decisive load  
for ball bearings,  
tapered roller bearings and  
spherical roller bearings**

| Bearing type                                 | Single bearing<br>$P_1$   | Bearing pair<br>$P_1$  |
|--|---|--|
| Deep groove ball bearings                    | $3,3 \cdot F_a - 0,1 \cdot F_r$   | –  |
| Angular contact ball bearings,<br>single row | $F_a - 0,1 \cdot F_r$   | $1,4 \cdot F_a - 0,1 \cdot F_r$                              |
| Four point contact bearings                  | $1,5 \cdot F_a + 3,6 \cdot F_r$   | –  |
| Tapered roller bearings                      | $2 \cdot Y \cdot F_a$ or $F_r$ ,<br>use the greater value   | $1,21 \cdot Y \cdot F_a$ or $F_r$ ,<br>use the greater value |
| Spherical roller bearings                    | $1,6 \cdot F_a/e$ if $F_a/F_r > e$<br>$F_r \{1 + 0,6 \cdot [F_a/(e \cdot F_r)]^3\}$ if $F_a/F_r \leq e$ |  |



For  $P_1 \leq F_r$ ,  $P_1 = F_r$  applies.

## Friction and increases in temperature

### Cylindrical roller bearings under axial load

In cylindrical roller bearings under axial load, sliding friction between the end faces of the rolling elements and the ribs on the rings leads to an additional frictional torque  $M_2$ .

The total frictional torque is therefore calculated as follows:

$$M_R = M_0 + M_1 + M_2$$

$$M_2 = f_2 \cdot F_a \cdot d_M$$

$$A = k_B \cdot 10^{-3} \cdot d_M^{2,1}$$

|   |     |
|---|-----|
| $M_R$   | Nmm |
| Total frictional torque   |     |
| $M_0$   | Nmm |
| Frictional torque as a function of speed  |     |
| $M_1$   | Nmm |
| Frictional torque as a function of radial load  |     |
| $M_2$   | Nmm |
| Frictional torque as a function of axial load   |     |
| $f_2$   | –   |
| Factor as a function of the bearing series, <i>Figure 3</i> and <i>Figure 4</i> , page 59 |     |
| A   | –   |
| Bearing parameter according to equation   |     |
| $F_a$   | N   |
| Axial dynamic bearing load  |     |
| $k_B$   | –   |
| Factor as a function of the bearing series, see table, page 59                            |     |
| $d_M$   | mm  |
| Mean bearing diameter $(d + D)/2$ .   |     |



The bearing factors  $f_2$  are subject to wide scatter. They are valid for recirculating oil lubrication with an adequate quantity of oil. The curves must not be extrapolated, *Figure 3* and *Figure 4*, page 59.

### Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity has been significantly improved through the use of new calculation and manufacturing methods.

A special curvature on the end faces of the rollers ensures optimum contact conditions between the roller and rib.

As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

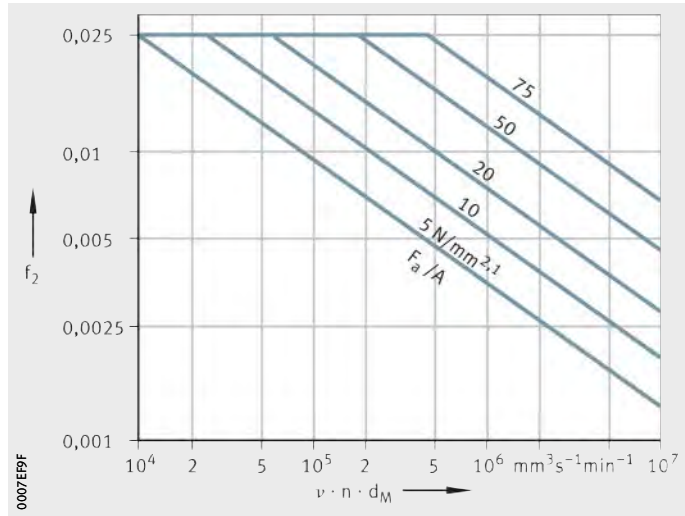
In addition, the axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.



**Cylindrical roller bearings of standard design**

- $f_2$  = bearing factor
- $\nu$  = operating viscosity
- $n$  = operating speed
- $d_M$  = mean bearing diameter
- $\nu \cdot n \cdot d_M$  = operating parameter
- $F_a$  = axial dynamic bearing load
- $A$  = bearing parameter

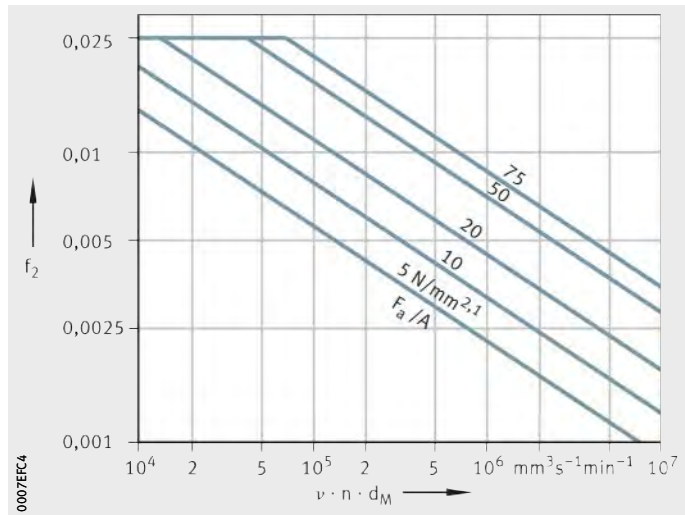
*Figure 3*  
Bearing factor  $f_2$ , as a function of operating parameter



**Cylindrical roller bearings of TB design**

- $f_2$  = bearing factor
- $\nu$  = operating viscosity
- $n$  = operating speed
- $d_M$  = mean bearing diameter
- $\nu \cdot n \cdot d_M$  = operating parameter
- $F_a$  = axial dynamic bearing load
- $A$  = bearing parameter

*Figure 4*  
Bearing factor  $f_2$ , as a function of operating parameter



**Bearing factor  $k_B$**

| Bearing series                             | Factor $k_B$ |
|--|--------------|
| SL1818, SL0148                             | 4,5          |
| SL1829, SL0149                             | 11           |
| SL1830, SL1850                             | 17           |
| SL1822                                     | 20           |
| LSL1923                                    | 28           |
| SL1923                                     | 30           |
| NJ2...-E, NJ22...-E, NUP2...-E, NUP22...-E | 15           |
| NJ3...-E, NJ23...-E, NUP3...-E, NUP23...-E | 20           |
| NJ4  | 22           |

# Speeds

On the basis of DIN 732-1, calculation of the thermal reference speed  $n_B$  has been standardised in ISO 15 312. The calculation of reference speeds has been matched to this standard. As a result, the values are different from the previous catalogue data. The symbols used in the equations have been matched to the international standard.

## Thermal reference speed

The thermal reference speed  $n_B$  is used as an ancillary value when calculating the thermally safe operating speed  $n_{\Phi}$ . It is the speed at which, under defined reference conditions, a bearing temperature of +70 °C is achieved.

## Reference conditions

The reference conditions are based on the usual operating conditions of the most significant bearing types and sizes.

They are defined in ISO 15 312 as follows:

- mean ambient temperature  $\vartheta_{Ar} = +20$  °C
- mean bearing temperature at the outer ring  $\vartheta_r = +70$  °C
- load on radial bearings  $P_{1r} = 0,05 \cdot C_{0r}$
- load on axial bearings  $P_{1a} = 0,02 \cdot C_{0a}$
- the operating viscosities (axial bearings according to DIN 732-1)  
For radial bearings, they are such that approximately the same reference speeds are achieved for oil and grease lubrication.
  - radial bearings:  $12 \text{ mm}^2\text{s}^{-1}$  (ISO VG class 32)
  - axial spherical roller bearings:  $24 \text{ mm}^2\text{s}^{-1}$  (ISO VG class 68)
  - axial cylindrical roller bearings:  $48 \text{ mm}^2\text{s}^{-1}$  (ISO VG class 220)
- heat dissipation via the bearing seating surfaces, see equations.

For radial bearings, bearing seat  $A_r \leq 50\,000 \text{ mm}^2$ :

$$q_r = 0,016 \text{ W/mm}^2$$

For radial bearings, bearing seat  $A_r > 50\,000 \text{ mm}^2$ :

$$q_r = 0,016 \cdot \left( \frac{A_r}{50\,000} \right)^{-0,34} \text{ W/mm}^2$$

For axial bearings, bearing seat  $A_r \leq 50\,000 \text{ mm}^2$ :

$$q_r = 0,020 \text{ W/mm}^2$$

For axial bearings, bearing seat  $A_r > 50\,000 \text{ mm}^2$ :

$$q_r = 0,020 \cdot \left( \frac{A_r}{50\,000} \right)^{-0,16} \text{ W/mm}^2$$



### Limiting speed

The limiting speed  $n_G$  is based on practical experience and takes account of additional criteria such as smooth running, sealing function and centrifugal forces.



The limiting speed must not be exceeded even under favourable operating and cooling conditions.

### Thermally safe operating speed

The thermally safe operating speed  $n_{\delta}$  is calculated according to DIN 732-2 (draft).

The basis for the calculation is the heat balance in the bearing, the equilibrium between the frictional energy as a function of speed and the heat dissipation as a function of temperature.

When conditions are in equilibrium, the bearing temperature is constant.

The permissible operating temperature determines the thermally safe operating speed  $n_{\delta}$  of the bearing. The preconditions for calculation are correct mounting, normal operating clearance and constant operating conditions.

The calculation method is not valid for:

- sealed bearings with contact seals, since the maximum speed is restricted by the permissible sliding velocity at the seal lip
- back-up rollers
- axial deep groove and axial angular contact ball bearings.



The limiting speed  $n_G$  must always be observed.

## Speeds

### Calculation of the thermally safe operating speed

The thermally safe operating speed  $n_{\vartheta}$  is a product of the reference speed  $n_B$  and the speed ratio  $f_n$ :

$$n_{\vartheta} = n_B \cdot f_n$$

The speed ratio is derived from *Figure 1*, page 63:

$$k_L \cdot f_n^{5/3} + k_P \cdot f_n = 1$$

In the normal range  $0,01 < k_L < 10$  and  $0,01 < k_P < 10$ ,  $f_n$  can be calculated using an approximation equation:

$$f_n = \frac{490,77}{1 + 498,78 \cdot k_L^{0,599} + 852,88 \cdot k_P^{0,963} - 504,5 \cdot k_L^{0,055} \cdot k_P^{0,832}}$$

Heat dissipation via the bearing seating surfaces  $\dot{Q}_S$ , *Figure 2*, page 63:

$$\dot{Q}_S = k_q \cdot A_r \cdot \Delta\vartheta_A$$

Heat dissipation by the lubricant  $\dot{Q}_L$ :

$$\dot{Q}_L = 0,0286 \frac{\text{kW}}{\text{l/min} \cdot \text{K}} \cdot \dot{V}_L \cdot \Delta\vartheta_L$$

Total dissipated heat flow  $\dot{Q}$ :

$$\dot{Q} = \dot{Q}_S + \dot{Q}_L - \dot{Q}_E$$

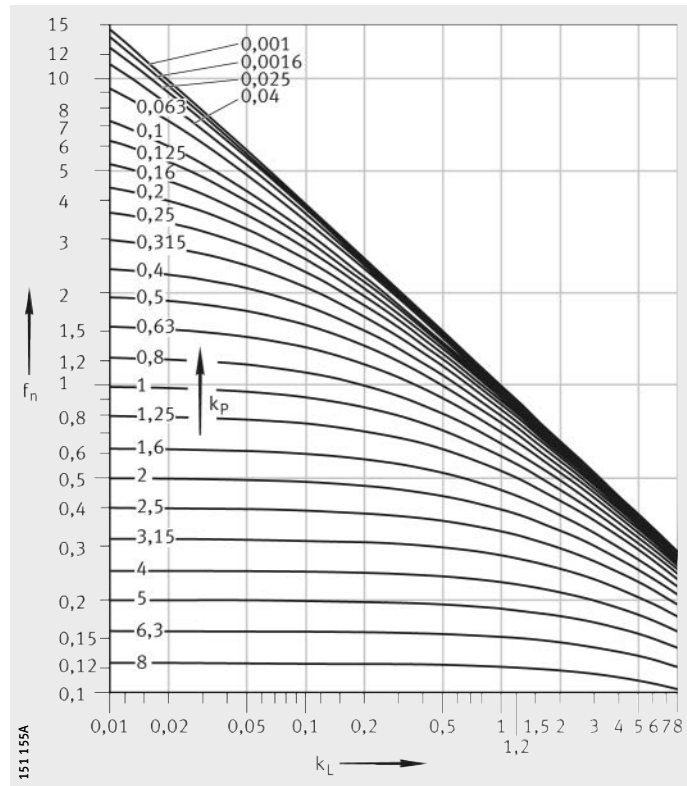
Lubricant film parameter  $k_L$ :

$$k_L = 10^{-6} \cdot \frac{\pi}{30} \cdot n_B \cdot \frac{10^{-7} \cdot f_0 \cdot (v \cdot n_B)^2 \cdot d_M^3}{\dot{Q}}$$

Load parameter  $k_P$ :

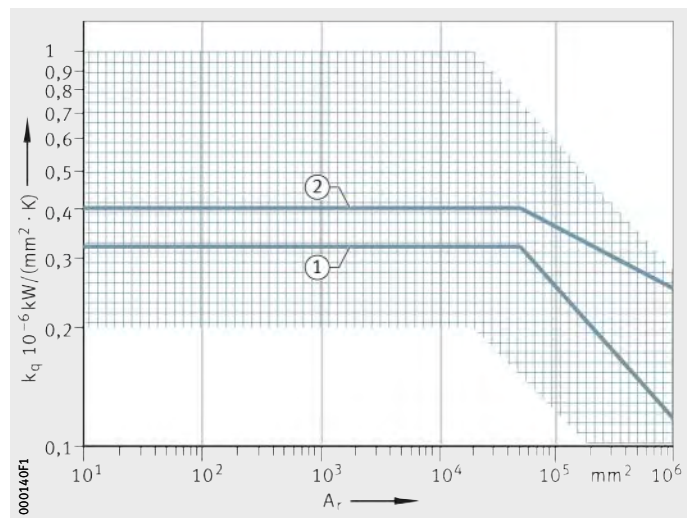
$$k_P = 10^{-6} \cdot \frac{\pi}{30} \cdot n_B \cdot \frac{f_1 \cdot P_1 \cdot d_M}{\dot{Q}}$$





$f_n$  = speed ratio  
 $k_L$  = lubricant film parameter  
 $k_p$  = load parameter

**Figure 1**  
 Speed ratio  $f_n$



$k_q$  = heat transfer coefficient  
 $A_r$  = bearing seating surface  
 ① Reference condition for radial bearings  
 ② Reference condition for axial bearings

**Figure 2**  
 Heat transfer coefficient  $k_q$   
 as a function  
 of the bearing seating surface

**Symbols,  
units and definitions**

$A_r$  mm<sup>2</sup>

Bearing seating surface for  
radial bearings:

axial bearings:

tapered roller bearings:

axial spherical roller bearings:

$$A_r = \pi \times B \times (D + d)$$

$$A_r = \pi/2 \times (D^2 - d^2)$$

$$A_r = \pi \times T \times (D + d)$$

$$A_r = \pi/4 \times (D^2 + d_1^2 - D_1^2 - d^2)$$

# Speeds

## Symbols, units and definitions continued

|   |   |
|---|---|
| B   | mm  |
| Bearing width   |   |
| d   | mm  |
| Bearing bore diameter   |   |
| D   | mm  |
| Bearing outside diameter  |   |
| $d_1$   | mm  |
| Outside diameter of shaft locating washer   |   |
| $D_1$   | mm  |
| Inside diameter of housing locating washer  |   |
| $d_M$   | mm  |
| Mean bearing diameter $(D + d)/2$   |   |
| $f_0$   | –   |
| Bearing factor for frictional torque as a function of speed,<br>see section Bearing factors, page 55  |   |
| $f_1$   | –   |
| Bearing factor for frictional torque as a function of load,<br>see section Bearing factors, page 55   |   |
| $f_n$   | –   |
| Speed ratio, <i>Figure 1</i> , page 63  |   |
| $k_L$   | –   |
| Lubricant film parameter  |   |
| $k_P$   | –   |
| Load parameter  |   |
| $k_q$   | $10^{-6} \text{ kW}/(\text{mm}^2 \cdot \text{K})$ |
| Heat transfer coefficient of bearing seating surface, <i>Figure 2</i> , page 63.<br>It is dependent on the housing design and size, the housing material and<br>the mounting position. In normal applications, the heat transfer coefficient for<br>bearing seating surfaces up to 25 000 mm <sup>2</sup> is between<br>$0,2$ and $1,0 \cdot 10^{-6} \text{ kW}/(\text{mm}^2 \cdot \text{K})$ |   |
| $n_{\text{th}}$   | $\text{min}^{-1}$                                 |
| Thermally safe operating speed  |   |
| $n_B$   | $\text{min}^{-1}$                                 |
| Reference speed, see dimension tables   |   |
| $P_1$   | N   |
| Radial load for radial bearings, axial load for axial bearings  |   |
| $q_r$   | $\text{W}/\text{mm}^2$                            |
| Heat flow density   |   |
| $\dot{Q}$   | kW  |
| Total dissipated heat flow  |   |
| $\dot{Q}_E$   | kW  |
| Heat flow due to heating by external source   |   |
| $\dot{Q}_L$   | kW  |
| Heat flow dissipated by the lubricant   |   |
| $\dot{Q}_S$   | kW  |
| Heat flow dissipated via the bearing seating surfaces   |   |
| T   | mm  |
| Total width of tapered roller bearing   |   |
| $\dot{V}_L$   | $\text{l}/\text{min}$                             |
| Oil flow  |   |
| $\Delta\vartheta_A$   | K   |
| Difference between mean bearing temperature and ambient temperature   |   |
| $\Delta\vartheta_L$   | K   |
| Difference between oil outlet temperature and oil inlet temperature   |   |
| $\nu$   | $\text{mm}^2\text{s}^{-1}$                        |
| Kinematic viscosity of lubricant at operating temperature.  |   |



# Lubrication

## Principles

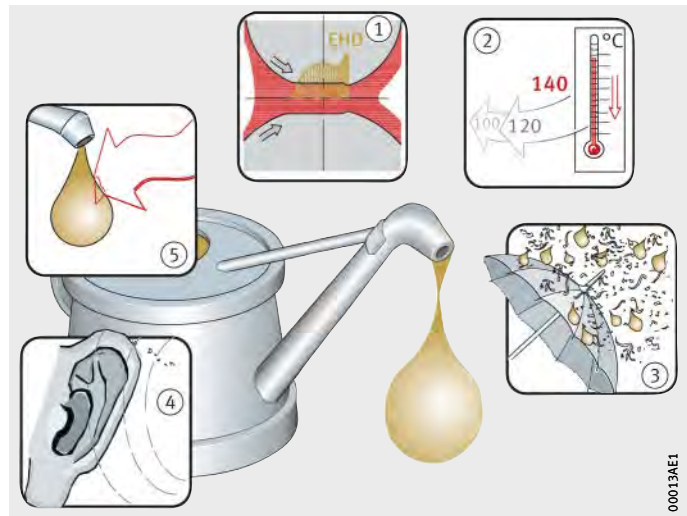
Lubrication and maintenance are important for the reliable operation and long operating life of rolling bearings.

## Functions of the lubricant

The lubricant should, *Figure 1*:

- form a lubricant film on the contact surfaces that is sufficiently capable of supporting loads and thus preventing wear and premature fatigue ①
- dissipate heat in the case of oil lubrication ②
- give additional sealing of the bearing, in the case of grease lubrication, against the entry of both solid and fluid contaminants ③
- reduce the running noise ④
- protect the bearing against corrosion ⑤.

- ① Formation of a lubricant film capable of supporting loads
- ② Heat dissipation in the case of oil lubrication
- ③ Sealing of the bearing against external contaminants in the case of grease lubrication
- ④ Damping of running noise
- ⑤ Protection against corrosion



*Figure 1*  
Functions of the lubricant

00013AE1

# Lubrication

## Selection of the type of lubrication

It should be determined as early as possible in the design process whether bearings should be lubricated using grease or oil.

The following factors are decisive in determining the type of lubrication and quantity of lubricant:

- the operating conditions
- the type and size of the bearing
- the adjacent construction
- the lubricant feed.

## Criteria for grease lubrication

In the case of grease lubrication, the following criteria must be considered:

- very little design work required
- the sealing action
- the reservoir effect
- long operating life with little maintenance work (lifetime lubrication possible in certain circumstances)
- if relubrication is required, it may be necessary to provide collection areas for old grease and feed ducts
- no heat dissipation by the lubricant
- no rinsing out of wear debris and other particles.

## Criteria for oil lubrication

In the case of oil lubrication, the following criteria must be considered:

- good lubricant distribution and supply to contact areas
- dissipation of heat possible from the bearing (significant principally at high speeds and/or loads)
- rinsing out of wear debris
- very low friction losses with minimal quantity lubrication
- more work required on feed and sealing.

Under extreme operating conditions (such as very high temperatures, vacuum, aggressive media), it may be possible to use special lubrication methods such as solid lubricants in consultation with the engineering service.



## Design of lubricant feed

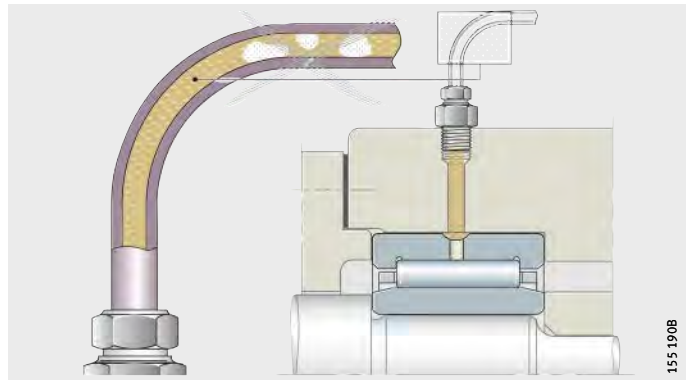
The feed lines and lubrication holes in the housings and shafts, *Figure 2* and *Figure 3* must:

- lead directly to the lubrication hole in the rolling bearing
- be as short as possible
- be provided individually for each bearing.

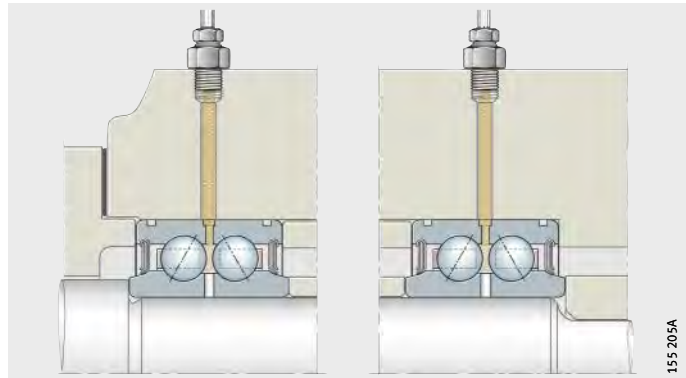


Ensure that the feed lines are filled, *Figure 3*; the feed line should be bled if necessary.

Follow the instructions provided by the lubrication device manufacturer.



*Figure 2*  
Lubricant feed lines



*Figure 3*  
Arrangement of feed to more than one bearing on a shaft

# Lubrication

## Grease lubrication

Greases can be differentiated in terms of their thickeners and base oils. The base oils of greases are covered by the information in the section Oil lubrication, page 85.

## Composition of a grease

Conventional greases have metal soaps as thickeners and a mineral base oil. They also contain additives. These have a specific influence on, for example, the characteristics in relation to wear prevention, corrosion prevention or resistance to ageing. These combinations of additives are not, however, fully effective across every temperature and load range.

Greases exhibit widely varying behaviour in response to environmental influences such as temperature and moisture.

- ① Thickener
- ② Additives
- ③ Base oil
- ④ Grease

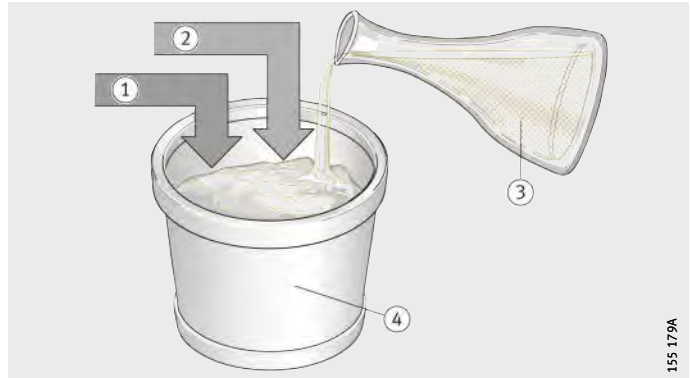


Figure 4  
Type of grease



Lubricants must always be checked for their compatibility with:

- other lubricants
- anti-corrosion agents
- thermoplastics, thermosets and elastomers
- light and non-ferrous metals
- coatings
- colouring agents and paints
- the environment.

When considering compatibility with the environment, attention must be paid to toxicity, biodegradability and water pollution class.



### Type of grease

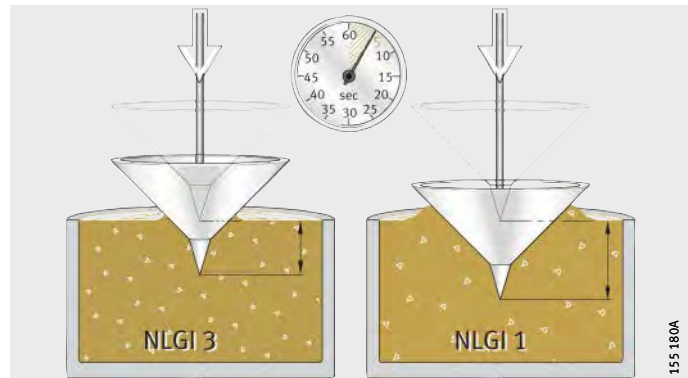
The characteristics of a grease are dependent on:

- the base oil
- the viscosity of the base oil (this is important for the speed range)
- the thickener (the shear strength is significant for the speed range)
- the additives.

### Consistency of greases

Greases are subdivided into consistency grades (NLGI grades to DIN 51 818).

For rolling bearings, grades 1, 2, 3 should be used in preference, *Figure 5*.



*Figure 5*  
Consistency of greases

# Lubrication

## Selection of suitable grease

Rolling bearing greases K to DIN 51 825 are suitable.

Greases should be selected in accordance with the operating conditions of the bearing:

- temperature
- compressive load, see page 72
- speed, see page 72
- the presence of water and moisture, see page 73.

## Operating temperature range

The operating temperature range of the grease must correspond to the range of possible operating temperatures in the rolling bearing.

Grease manufacturers indicate an operating temperature range for their rolling bearing greases K in accordance with DIN 51 825.

The upper value is determined in accordance with DIN 51 821 by means of testing on the FAG rolling bearing grease test rig FE 9. At the upper operating temperature, a 50% failure probability ( $F_{50}$ ) of at least 100 hours must be achieved in this test.

The lower value is defined in accordance with DIN 51 825 by means of flow pressure. The flow pressure of a grease is the pressure required to press a stream of grease through a defined nozzle. For greases of type K, the flow pressure at the lower operating temperature must be less than 1 400 mbar.

The use of flow pressure in determining the lower operating temperature only indicates, however, whether the grease can be moved at this temperature. This cannot be used to give an indication of its suitability for use in rolling bearings at low temperatures.

In addition to the lower operating temperature of a grease, therefore, the low temperature frictional torque is also determined in accordance with ASTM D 1478 or IP 186/93. At the lower operating temperature, the starting torque must not exceed 1 000 Nmm and the running torque must not exceed 100 Nmm.





Schaeffler recommends that greases should be used in accordance with the bearing temperature normally occurring in the standard operating range in order to achieve a reliable lubricating action and an acceptable grease operating life, *Figure 6*.

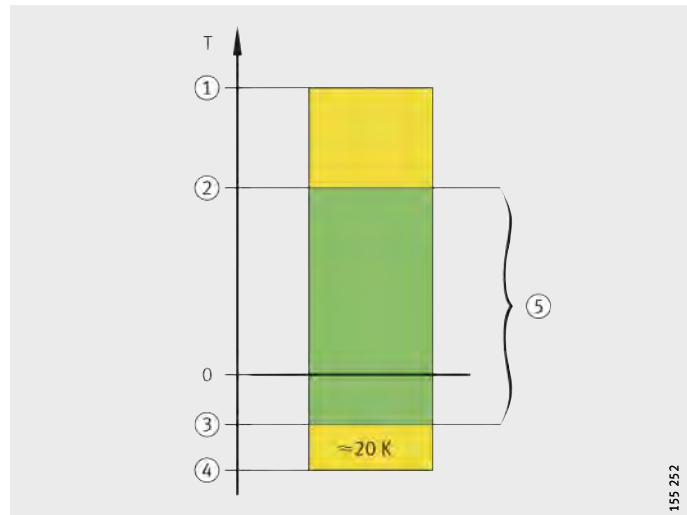
At low temperatures, greases release very little base oil. This can result in lubricant starvation. Schaeffler therefore recommends that greases are not used below the lower continuous limit temperature  $T_{\text{lowerlimit}}$ , *Figure 6*. This is approx. 20 K above the lower operating temperature of the grease as stated by the grease manufacturer.

The upper continuous limit temperature  $T_{\text{upperlimit}}$  must not be exceeded if a temperature-induced reduction in the grease operating life is to be avoided; see section Grease operating life, page 76.



At consistently low temperatures (for example in cold store applications), it must be ensured that the grease releases sufficient oil in relation to the bearing type.

- T = operating temperature
- ① Upper operating temperature according to grease manufacturer
  - ②  $T_{\text{upperlimit}}$
  - ③  $T_{\text{lowerlimit}}$
  - ④ Lower operating temperature according to grease manufacturer
  - ⑤ Standard operating range



*Figure 6*  
Operating temperature range

155 252

# Lubrication

## Pressure properties

The viscosity at operating temperature must be sufficiently high for the formation of a lubricant film capable of supporting loads. At high loads, greases with EP characteristics (EP = Extreme Pressure) and high base oil viscosity should be used (KP grease to DIN 51 825). Such greases should also be used for bearings with substantial sliding or line contact.

Silicone greases should only be used at low loads ( $P \leq 0,03 \cdot C$ ).



Greases with solid lubricants should preferably be used for applications with mixed or boundary friction conditions. The solid lubricant particle size must not exceed 5  $\mu\text{m}$ .

## Speed

Greases should be selected in accordance with the speed parameter  $n \cdot d_M$  for grease, see table, page 74:

- For rolling bearings running at high speeds or with a low starting torque, greases with a high speed parameter should be used.
- For bearings running at low speeds, greases with a low speed parameter should be used.

Under centrifugal accelerations  $> 500 \text{ g}$ , separation (of the thickener and base oil) may occur. In this case, please consult the lubricant manufacturer.



The consistency of polycarbamide greases can be altered by shear stresses to a greater extent than that of metal soap greases.



### Water and moisture

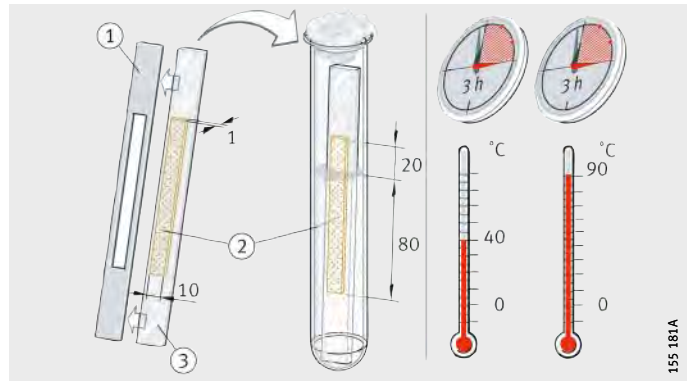
Water in the grease has a highly detrimental effect on the operating life of the bearing:

- The static behaviour of greases in the presence of water is assessed in accordance with DIN 51 807, *Figure 7*.
- The anti-corrosion characteristics can be tested according to DIN 51 802 (Emcor test) (information is given in the datasheets from the grease manufacturers).

- ① Blank
- ② Grease specimen
- ③ Glass slide

*Figure 7*

Behaviour in the presence of water in accordance with DIN 51 807



# Lubrication

## Greases with special suitability

Many of the rolling bearings supplied by Schaeffler Technologies have a grease filling. The greases used have proved particularly suitable for the applications in mechanical-dynamic tests, see table.

### Greases

| Designation <sup>1)</sup> | Classification  | Type of grease                      |
|---------------------------|---|-------------------------------------|
| <b>GA01</b>               | Ball bearing grease for $T < +180\text{ °C}$                                      | Polycarbamide<br>Ester oil          |
| <b>GA02</b>               | Ball bearing grease for $T < +160\text{ °C}$                                      | Polycarbamide<br>SHC                |
| <b>GA13</b>               | Standard ball bearing and insert bearing grease for $D > 62\text{ mm}$            | Lithium soap<br>Mineral oil         |
| <b>GA14</b>               | Low-noise ball bearing grease for $D \leq 62\text{ mm}$                           | Lithium soap<br>Mineral oil         |
| <b>GA15</b>               | Low-noise ball bearing grease for high speeds                                     | Lithium soap<br>Ester oil           |
| <b>GA22</b>               | Free-running grease with low frictional torque                                    | Lithium soap<br>Ester oil           |
| <b>GA08</b>               | Grease for line contact   | Lithium complex soap<br>Mineral oil |
| <b>GA11</b>               | Rolling bearing grease resistant to media for temperatures up to $+250\text{ °C}$ | PTFE<br>Alkoxyfluoroether           |
| <b>GA47</b>               | Rolling bearing grease resistant to media for temperatures up to $+140\text{ °C}$ | Barium complex soap<br>Mineral oil  |

<sup>1)</sup> GA stands for **G**rease **A**pplication Group, based on Grease Spec 00.

<sup>2)</sup> The upper continuous limit temperature  $T_{\text{upperlimit}}$  must not be exceeded if a temperature-induced reduction in grease operating life is to be avoided.

<sup>3)</sup> Dependent on bearing type.



| Operating temperature range<br>°C | Upper continuous limit temperature<br>T <sub>upperlimit</sub> <sup>2)</sup><br>°C | NLGI grade | Speed parameter<br>n · d <sub>M</sub><br>min <sup>-1</sup> · mm | ISO VG class<br>(base oil) <sup>3)</sup> | Designation <sup>1)</sup> | Recommended Arcanol grease for relubrication |
|-----------------------------------|---|------------|---|--|---------------------------|--|
| -40 to +180                       | +115  | 2 to 3     | 600 000   | 68 to 220                                | <b>GA01</b>               | -  |
| -40 to +160                       | +85   | 2 to 3     | 500 000   | 68 to 220                                | <b>GA02</b>               | -  |
| -30 to +140                       | +75   | 3          | 500 000   | 68 to 150                                | <b>GA13</b>               | <b>MULTI3</b>                                |
| -30 to +140                       | +75   | 2          | 500 000   | 68 to 150                                | <b>GA14</b>               | <b>MULTI2</b>                                |
| -50 to +150                       | +70   | 2 to 3     | 1 000 000   | 22 to 32                                 | <b>GA15</b>               | -  |
| -50 to +120                       | +70   | 2          | 1 000 000   | 10 to 22                                 | <b>GA22</b>               | -  |
| -30 to +140                       | +95   | 2 to 3     | 500 000   | 150 to 320                               | <b>GA08</b>               | <b>LOAD150</b>                               |
| -40 to +250                       | +180  | 2          | 300 000   | 460 to 680                               | <b>GA11</b>               | <b>TEMP200</b>                               |
| -20 to +140                       | +70   | 1 to 2     | 350 000   | 150 to 320                               | <b>GA47</b>               | -  |

### Arcanol rolling bearing greases

For users who wish to charge their rolling bearings with grease themselves, there is a range of particularly suitable Arcanol rolling bearing greases.

The greases in the range are graded in terms of their performance capability such that they can be used to cover almost all areas of application, see section Arcanol rolling bearing greases, page 1046.

# Lubrication

## Grease operating life

The grease operating life  $t_{fG}$  applies where this is less than the calculated bearing life and the bearings are not lubricated.

A guide value can be determined in approximate terms as follows:

$$t_{fG} = t_f \cdot K_T \cdot K_P \cdot K_R \cdot K_U \cdot K_S$$

$t_{fG}$  h  
Guide value for grease operating life

$t_f$  h  
Basic grease operating life

$K_T, K_P, K_R, K_U, K_S$  –  
Correction factors for temperature, load, oscillation, environment, vertical shaft, see page 78 to page 81.



If a grease operating life  $> 3$  years is required, this should be discussed with the lubricant manufacturer.

## Basic grease operating life

This applies under the preconditions according to table.

### Preconditions for the basic grease operating life

| Criterion                | Precondition  |
|--------------------------|---|
| Bearing temperature      | $<$ Upper continuous limit temperature $T_{upperlimit}$ |
| Load ratio               | $C_0/P = 20$  |
| Speed and load           | Constant  |
| Load in main direction   | Radial in radial bearings, axial in axial bearings      |
| Axis of rotation         | Horizontal for radial bearings                          |
| Inner ring               | Rotating  |
| Environmental influences | No disruptive influences                                |

The basic grease operating life  $t_f$  is dependent on the bearing-specific speed parameter  $k_f \cdot n \cdot d_M$  and is calculated using *Figure 8*.

$k_f$  –  
Bearing type factor, see table Factor  $k_f$  as a function of bearing type, page 77

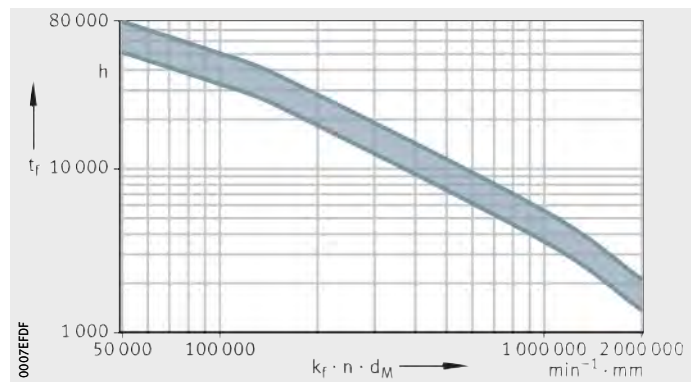
$n$   
Operating speed or equivalent speed

$d_M$  mm  
Mean bearing diameter  $(d + D)/2$ .

## Calculation of basic grease operating life

$t_f$  = basic grease operating life  
 $k_f \cdot n \cdot d_M$  = bearing-specific speed parameter

*Figure 8*  
Calculation of basic grease operating life  $t_f$





**Factor  $k_f$   
as a function of bearing type**

| Bearing type  | Factor $k_f$ |
|---|--------------|
| Deep groove ball bearings, single row   | 1            |
| Angular contact ball bearings, single row                                       | 1,6          |
| Angular contact ball bearings, double row                                       | 2            |
| Four point contact bearings   | 1,6          |
| Axial deep groove ball bearings   | 5,5          |
| Axial angular contact ball bearings, double row                                 | 1,4          |
| Cylindrical roller bearings, single row, with constant axial load               | 3,25         |
| Cylindrical roller bearings, single row, with or without alternating axial load | 2            |
| Cylindrical roller bearings, double row <sup>1)</sup>                           | 3,5          |
| Cylindrical roller bearings, full complement                                    | 5,3          |
| Tapered roller bearings   | 4            |
| Barrel roller bearings  | 10           |
| Spherical roller bearings without central rib                                   | 8            |
| Spherical roller bearings with central rib                                      | 10,5         |
| Back-up rollers   | 20           |
| Cylindrical roller bearings LSL   | 3,1          |
| Axial cylindrical roller bearings   | 58           |

<sup>1)</sup> Not valid for super precision cylindrical roller bearings NN30 and NNU49. In this case, please use the calculation scheme in the publication Super Precision Bearings, SP 1.

**Guidelines on calculating  
the grease operating life**  
Combined rolling bearings



The radial and axial bearing components must be calculated separately; the decisive value is the shorter grease operating life.

Rotating outer ring

If the outer ring is the rotating component, there may be a reduction in the grease operating life.

In the case of back-up rollers:

- the angular misalignment must be zero
- the effect of the rotating outer ring on the grease operating life is taken into consideration in the bearing type factor  $k_f$ .

# Lubrication

## Restrictions



The grease operating life cannot be determined using the method described in the following cases:

- if the grease can leave the bearing arrangement
  - if there is excessive evaporation of the base oil
  - in bearing positions without seals
  - in axial bearings with a horizontal axis of rotation
- if air is sucked into the rolling bearing during operation
  - this can cause the grease to oxidise
- in combined rotary and linear motion
  - the grease is distributed over the whole stroke length
- if contamination, water or other fluids enter the bearings
- for spindle bearings
- for high precision bearings for combined loads
- for high precision cylindrical roller bearings.

The additional guidelines on lubrication in the product sections must be observed.

## Correction factors for determining the grease operating life

Temperature factor  $K_T$

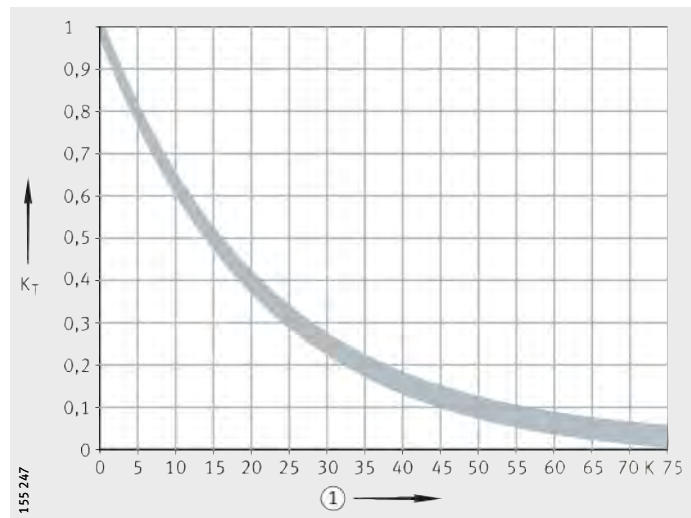
If the bearing temperature is higher than the continuous limit temperature  $T_{upperlimit}$ ,  $K_T$  must be determined from the diagram, *Figure 9*.



The diagram should not be used if the bearing temperature is higher than the upper operating temperature of the grease used, see table Greases, page 74. If necessary, a different grease should be selected or contact should be made with the Schaeffler engineering service.

$K_T$  = temperature factor  
① K above  $T_{upperlimit}$

*Figure 9*  
Temperature factor



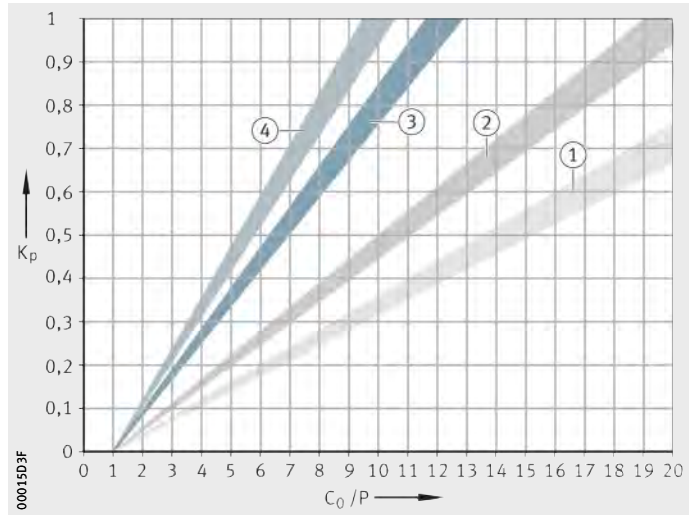




Load factor  $K_p$  The factor  $K_p$  is dependent on the bearing and describes the reduction at higher load (this places greater strain on the grease), *Figure 10* and table.

This is based on high-quality lithium soap greases

$K_p$  = load factor  
 $C_0/P$  = ratio between basic static load rating and equivalent dynamic bearing load  
 ①, ②, ③, ④ see table  $K_p$  factor



*Figure 10*  
 $K_p$  factor for bearings

**$K_p$  factor**

| Curve <sup>1)</sup> | Bearing type   |
|---------------------|--|
| ①                   | Axial angular contact ball bearings, double row                        |
|                     | Axial deep groove ball bearings  |
|                     | Axial cylindrical roller bearings                                      |
| ②                   | Spherical roller bearings with central rib                             |
|                     | Cylindrical roller bearings, double row (excluding NN30)               |
|                     | Back-up rollers  |
| ③                   | Cylindrical roller bearings LSL  |
|                     | Tapered roller bearings  |
|                     | Spherical roller bearings without central rib (E1)                     |
|                     | Barrel roller bearings   |
|                     | Cylindrical roller bearings, full complement                           |
|                     | Cylindrical roller bearings, single row (constant or alternating load) |
|                     | Four point contact bearings  |
| ④                   | Deep groove ball bearings  |
|                     | Angular contact ball bearings (single or double row)                   |
|                     | Self-aligning ball bearings  |

<sup>1)</sup> Curves: see *Figure 10*.

# Lubrication

Oscillation factor  $K_R$  The factor  $K_R$  applies for an angle of oscillation  $\varphi < 180^\circ$ , *Figure 11* and *Figure 12*. Oscillating motion places a greater strain on the grease than does rotating motion.

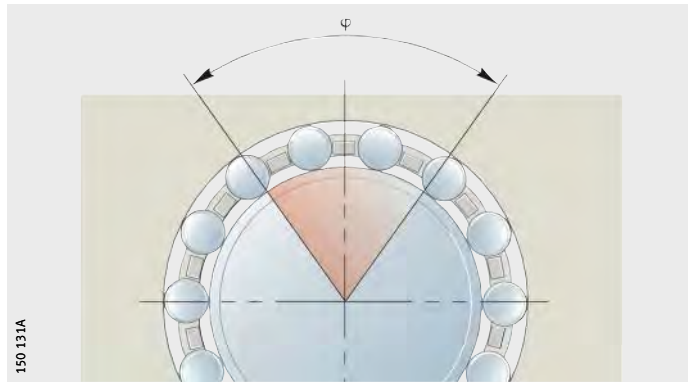


In order to reduce fretting corrosion, the lubrication interval should be reduced.

If the rolling elements do not undergo complete rotation, please contact the Schaeffler engineering service.

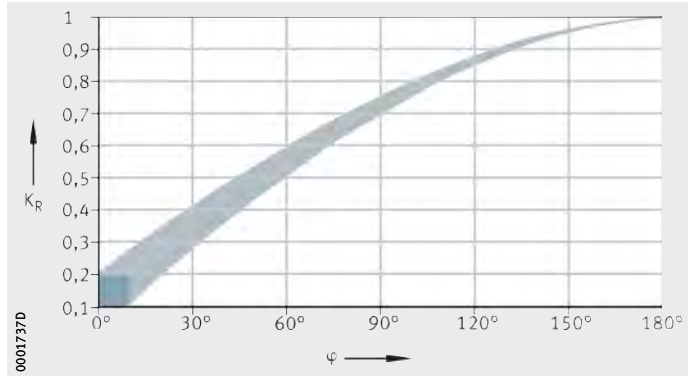
$\varphi$  = angle of oscillation

*Figure 11*  
Angle of oscillation



$K_R$  = oscillation factor  
 $\varphi$  = angle of oscillation

*Figure 12*  
Oscillation factor





Factor  $K_U$   
for environmental influences

The factor  $K_U$  takes account of the influences of moisture, shaking forces, slight vibration (leading to fretting corrosion) and shocks, see table Environmental factor  $K_U$ .



It does not take account of extreme environmental influences such as water, aggressive media, contamination, radiation and extreme vibrations such as those occurring in vibratory machines.

In relation to contamination, the influence of contamination on rating life calculation must also be noted, see section Load carrying capacity and life, page 30.

**Environmental factor  $K_U$**

| Environmental influence | Factor $K_U$ |
|-------------------------|--------------|
| Slight                  | 1            |
| Moderate                | 0,8          |
| Severe                  | 0,5          |

Factor  $K_S$   
for vertical shafts

If increased escape of grease is expected, for example in the case of radial bearings with a vertical axis of rotation, the factor  $K_S$  according to the table must be taken into consideration.

**$K_S$  factor**

| Arrangement of shaft            | Factor $K_S$ |
|---------------------------------|--------------|
| Vertical (depending on sealing) | 0,5 to 0,7   |
| Other arrangement               | 1            |

# Lubrication

## Relubrication intervals

If rolling bearings are relubricated, attention must be paid to the lubrication interval in order to ensure reliable function of the bearings.



The precise lubrication interval should be determined by tests conducted under application conditions.

This should be carried out as follows:

- Sufficiently long observation periods must be used.
- The condition of the grease must be checked at regular intervals.

For reasons of operational reliability, relubrication intervals of > 1 year are not recommended.

## Lubrication interval guide value

Experience shows that a guide value for most applications is:

$$t_{FR} = 0,5 \cdot t_{FG}$$

$t_{FR}$  h  
Guide value for relubrication interval

$t_{FG}$  h  
Guide value for grease operating life, see page 76.

## Relubrication conditions

The grease used for relubrication must be the same as that used in initial greasing.

If different greases are used, their miscibility and compatibility must be checked; see section Miscibility, page 84.

## Relubrication quantity

Due to the compact construction of the bearings, relubrication should be carried out using 50% to 80% of the initial greasing quantity (recommendation).

If feed lines filled with air are present, the filling volume of the feed lines should be included in calculation of the relubrication quantity.

## Relubrication

Relubrication should always be carried out as follows:

- with the bearing still warm from operation and rotating if safe to do so
- before the bearing comes to rest if safe to do so
- before extended breaks in operation.

Relubrication should continue until a fresh collar of grease appears at the seal gaps. Old grease must be allowed to leave the bearing unhindered.



### Grease reservoir

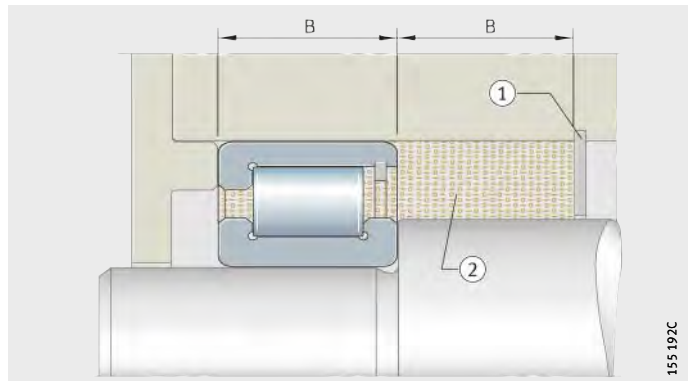
The initial greasing quantity is between 30% and 100% of the available volume in the bearing, dependent on the bearing type and operating conditions.

A grease reservoir can extend the grease operating life. The grease in the reservoir must be in constant contact with the grease on the raceway. Increasing the size of the grease reservoir does not lead to a proportional increase in the grease operating life.

The volume of the grease reservoir should correspond to the area in the bearing between the inner and outer ring (not taking account of the cage and rolling elements), *Figure 13* and *Figure 14*.

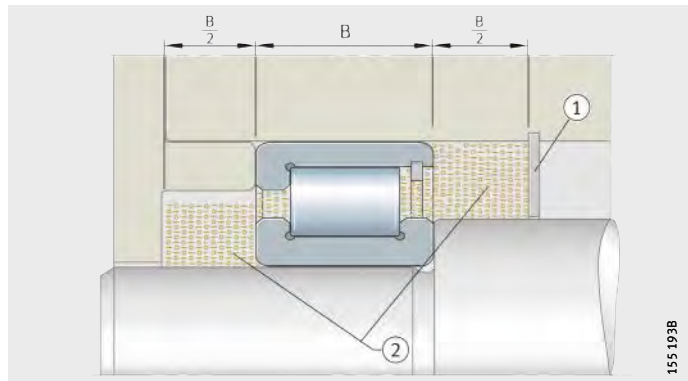
Evaporation of the base oil should be prevented by design measures, for example by sealing shields, *Figure 13* and *Figure 14*.

- ① Sealing shield
- ② Grease reservoir



*Figure 13*  
Grease reservoir on one side

- ① Sealing shield
- ② Grease reservoir



*Figure 14*  
Grease reservoir on both sides

# Lubrication

**Miscibility** Mixtures of greases should be avoided if at all possible.

Preconditions If they are unavoidable, the following preconditions must be fulfilled:

- The base oil must be the same.
- The thickener types must match.
- The base oil viscosities must be similar (they must not differ by more than one ISO VG class).
- The consistency must be identical (NLGI grade).



Miscibility of greases must always be agreed in consultation with the lubricant manufacturer.

Even when these preconditions are fulfilled, impairment of the performance capability of the mixed grease cannot be ruled out. If a decision is taken to change to a different grease grade, the grease should be rinsed out if this is possible. Further relubrication should be carried out after a shortened period.

If incompatible greases are mixed, this can lead to considerable structural changes. Substantial softening of the grease mixture may also occur.

Definite statements on miscibility can only be obtained by means of suitable tests.

**Storage** Experience shows that the greases used can generally be stored for 3 years.

Preconditions The preconditions are:

- a closed room or store
- temperatures between 0 °C and +40 °C
- relative humidity no greater than 65%
- no influence of chemical agents (vapours, gases, fluids)
- the rolling bearings are sealed.

Lubricants age due to environmental influences. The information provided by lubricant manufacturers must always be observed.



After long periods of storage, the start-up frictional torque of greased bearings can be temporarily higher than normal. The lubricity of the grease may also have deteriorated.

Since the lubrication characteristics of greases vary and different raw materials may be used for greases of the same name, Schaeffler cannot offer any guarantees either for the lubricants used by customers for relubrication or for their characteristics.



## Oil lubrication

For the lubrication of rolling bearings, mineral oils and synthetic oils are essentially suitable.

Oils with a mineral oil base are used most frequently. They must fulfil at least the requirements according to DIN 51 517 or DIN 51 524.

Special oils, often synthetic oils, are used under extreme operating conditions or where there are special requirements relating to oil resistance.

In these cases, please consult the lubricant manufacturer or the Schaeffler engineering service.

## Operating temperatures



The information provided by the lubricant manufacturer should be taken as authoritative.

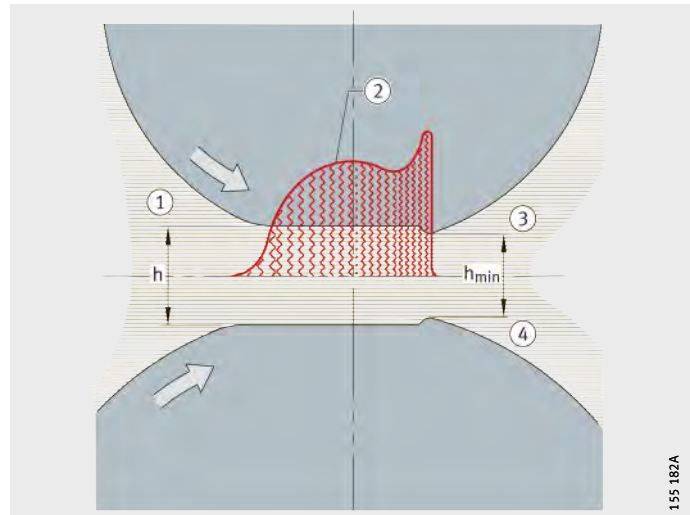
## Selection of suitable oil

The achievable bearing life and security against wear are higher with better separation of the contact surfaces by a lubricant film, *Figure 15* and section Load carrying capacity and life, page 30.

- ① Entry zone
- ② Pressure curve according to EHD theory
- ③ Exit zone
- ④ Lubricant

*Figure 15*

Lubricant film in the contact zones



## Reference viscosity for mineral oils

The guide value for  $\nu_1$  is dependent on the mean bearing diameter  $d_M$  and the speed  $n$ . It takes account of the EHD theory of lubricant film formation and practical experience.

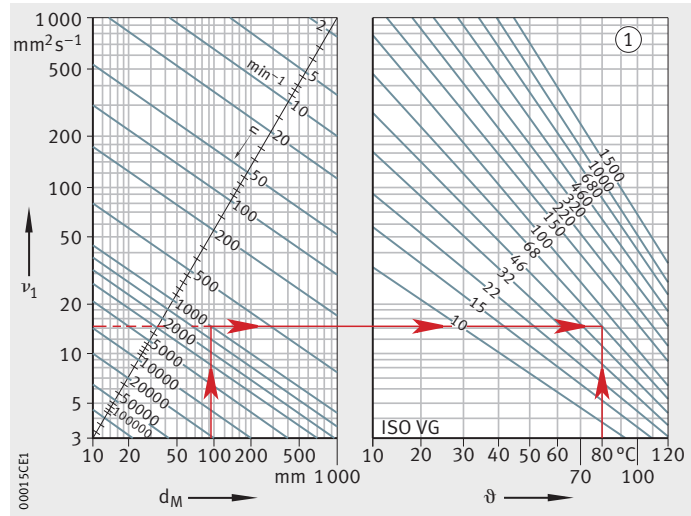
Depending on the operating speed, the oil at operating temperature must have at least the reference viscosity  $\nu_1$ , *Figure 16*, page 86.

# Lubrication

- $\nu_1$  = reference viscosity
- $d_M$  = mean bearing diameter  $(d + D)/2$
- $n$  = operating speed
- $\vartheta$  = operating temperature
- ① Viscosity  $\text{mm}^2\text{s}^{-1}$  at  $+40^\circ\text{C}$

*Figure 16*  
Reference viscosity and  
V/T diagram for mineral oils

Calculation of reference viscosity



The reference viscosity  $\nu_1$  is determined as follows:

- Assign  $\nu_1$  to a nominal viscosity with ISO VG between 10 and 1500 (centre point viscosity to DIN 51 519).
- Round intermediate values to the nearest ISO VG (due to the steps between groups).



This method cannot be used for synthetic oils, since these have different V/P (viscosity/pressure) and V/T (viscosity/temperature) characteristics.

In these cases, please consult the Schaeffler engineering service.

## Influence of temperature on viscosity

As the temperature increases, the viscosity of the oil decreases. This temperature-dependent change in the viscosity is described using the viscosity index VI. For mineral oils, the VI index should be at least 95.

When selecting the viscosity, the lower operating temperature must be taken into consideration, since the increasing viscosity will reduce the flowability of the lubricant. As a result, the level of power losses may increase.

A very long life can be achieved with a viscosity ratio  $\kappa = \nu/\nu_1 = 3$  to  $4$  ( $\nu$  = operating viscosity). Highly viscous oils do not, however, bring only advantages. In addition to the power losses arising from lubricant friction, there may be problems with the feed and removal of oil at low or even at normal temperatures.

The oil selected must be sufficiently viscous that it gives the highest possible fatigue life. It must also be ensured that the bearings are always supplied with adequate quantities of oil.





### Pressure properties and anti-wear additives

If the bearings are subjected to high loads or if the operating viscosity  $\nu$  is less than the reference viscosity  $\nu_1$ , oils with anti-wear additives (type P to DIN 51 502) should be used.

Such oils are also necessary for rolling bearings with a substantial proportion of sliding contact (for example bearings with line contact).

These additives form boundary layers to reduce the harmful effects of metallic contact occurring at various points (wear).

The suitability of these additives varies and is normally heavily dependent on temperature. Their effectiveness can only be assessed by means of testing in the rolling bearing (for example on our test rig FE8 to DIN 51 819).



Silicone oils should only be used for low loads ( $P \leq 0,03 \cdot C$ ).

### Compatibility

Before an oil is used, its behaviour must be checked in relation to plastics, seal materials (elastomers) and light and non-ferrous metals.

This must always be checked under dynamic loading and at operating temperature.

Synthetic oils must always be checked for their compatibility. The lubricant manufacturer must be consulted on this at the same time.

### Miscibility

The mixing of different oils should be avoided wherever possible. In particular, the presence of different additive packages may lead to undesirable interactions.

In general, oils with a mineral oil base and the same classification are miscible, for example HLP can be mixed with HLP.

The viscosities should vary by no more than one ISO VG class.



Synthetic oils must always be checked for their compatibility. The lubricant manufacturer must be consulted on this at the same time.

Miscibility must be checked in advance for each individual case.

### Cleanliness

The cleanliness of the oil influences the rating life of bearings, see also section Load carrying capacity and life, page 30.

Schaeffler therefore recommends that an oil filter should be provided; attention must be paid to the filtration rate. The filter mesh should be  $< 25 \mu\text{m}$ .

# Lubrication

## Lubrication methods

The essential lubrication methods are:

- drip feed oil lubrication
- pneumatic oil lubrication  
(to protect the environment, this should be used as a substitute for oil mist lubrication)
- oil bath lubrication  
(immersion or sump lubrication)
- recirculating oil lubrication.

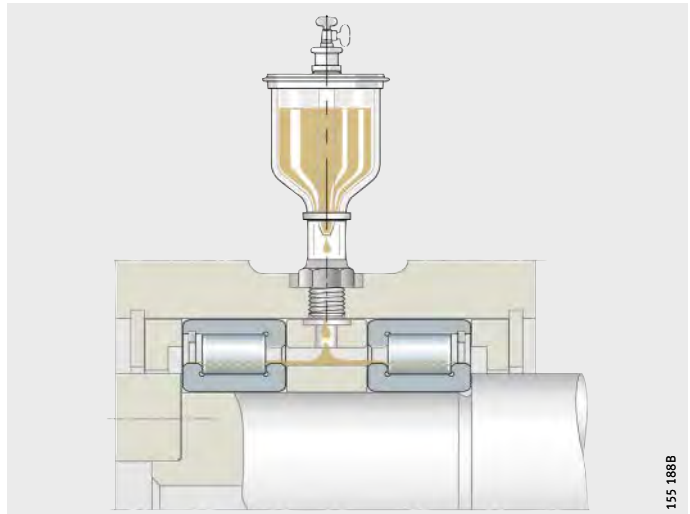
## Drip feed oil lubrication

This is suitable for bearings running at high speeds, *Figure 17*.

The oil quantity required is dependent on the type and size of bearing, the operating speed and the load.

The guide value is between 3 drops/min and 50 drops/min for each rolling element raceway (one drop weighs approx. 0,025 g).

Excess oil must be allowed to flow out of the bearing arrangement.



*Figure 17*  
Drip feed oil lubrication  
(schematic)



### Pneumatic oil lubrication

This method is particularly suitable for radial bearings running at high speeds and under low loads ( $n \cdot d_M = 800\,000$  to  $3\,000\,000 \text{ min}^{-1} \cdot \text{mm}$ ), *Figure 18*.

Clean compressed air free from moisture feeds oil to the bearing. This generates an excess pressure. This prevents contaminants from entering the bearing.

With a pneumatic oil lubrication system designed for minimal quantity lubrication, low frictional torque and a low operating temperature can be achieved.

Parameters for design of the lubrication system should be requested from the equipment manufacturers.



Pneumatic oil lubrication of axial bearings should be avoided if possible.

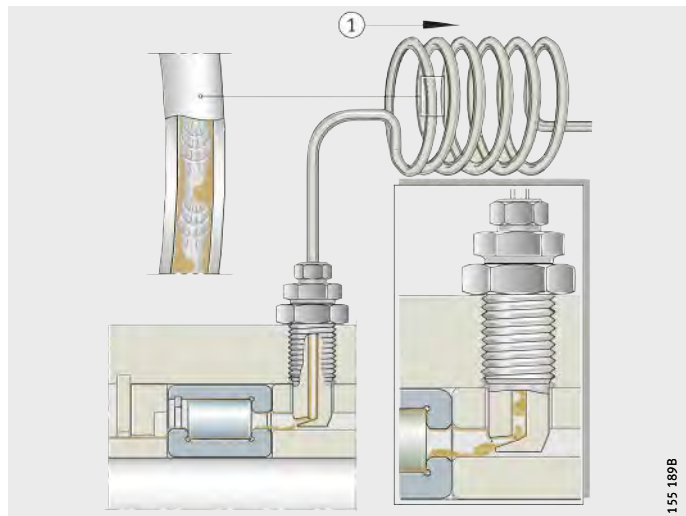
The oil quantity required for adequate supply is dependent on the bearing type.

Pneumatic oil lubrication has little cooling effect.

Follow the instructions provided by the manufacturers of the lubrication systems.

① To the pneumatic oil unit

*Figure 18*  
Pneumatic oil lubrication  
(schematic)



# Lubrication

## Oil bath lubrication

The oil level should reach the centre line of the lowest rolling element, *Figure 19*. If the oil level is higher than this, the bearing temperature may increase at high circumferential speeds as a result of losses due to splashing. Furthermore, foaming of the oil may occur.

In general, it is suitable for speeds up to

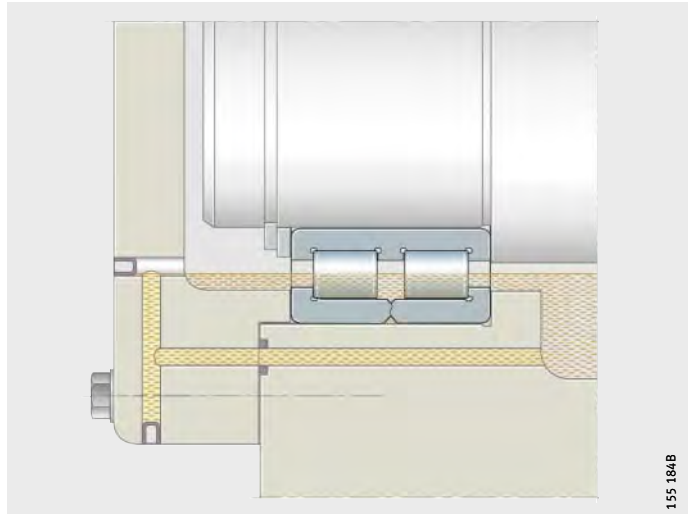
$$n \cdot d_M = 300\,000 \text{ min}^{-1} \cdot \text{mm}.$$

At  $n \cdot d_M < 150\,000 \text{ min}^{-1} \cdot \text{mm}$ , the bearing may be completely immersed.

In bearings with an asymmetrical cross-section, oil return ducts must be provided due to the pumping effect so that recirculation can be achieved.

In axial bearings, the oil level must cover the inside diameter of the axial cage.

The oil quantity in the housing must be adequately proportioned, otherwise very short oil change intervals will be necessary.



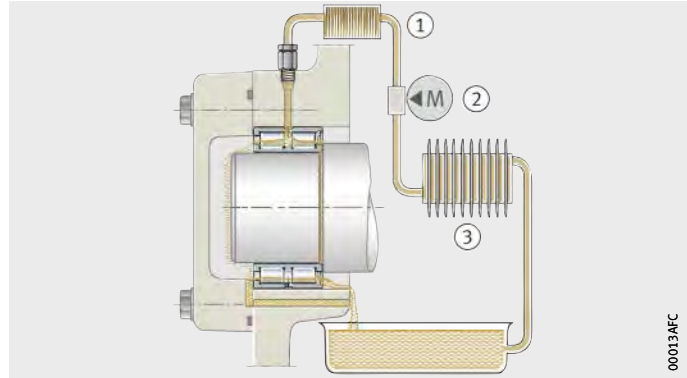
*Figure 19*  
Oil bath lubrication  
(schematic)



### Recirculating oil lubrication

In recirculating oil lubrication, the oil is subjected to additional cooling, *Figure 20*. The oil can therefore dissipate heat from the bearing. The quantity of oil required for heat dissipation is dependent on the cooling conditions, see section Speeds, page 60.

- ① Filter
- ② Pump
- ③ Cooling system

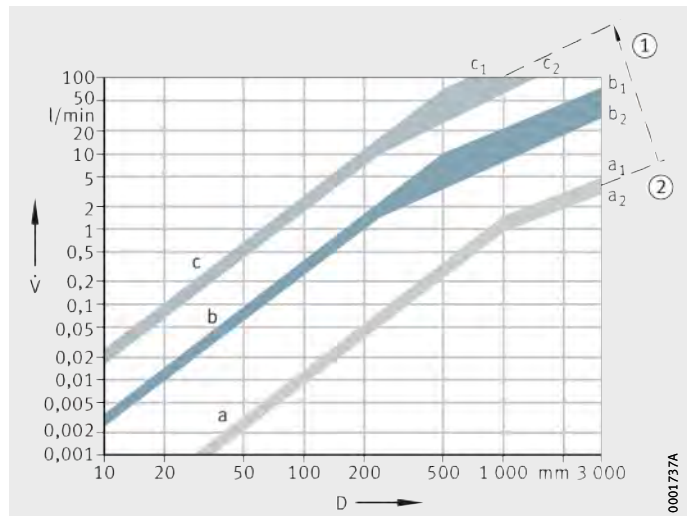


*Figure 20*  
Recirculating oil lubrication  
(schematic)

The oil quantities  $\dot{V}$  are matched to the operating conditions, *Figure 21*. The diagram indicates oil quantities that can be fed through the bearing without pressure with a side feed arrangement and banking up to the lower edge of the shaft.

For bearings with an asymmetrical cross-section (such as angular contact ball bearings, tapered roller bearings, axial spherical roller bearings), larger throughput quantities are permissible due to the pumping effect than for bearings with a symmetrical cross-section. Large quantities can be used to dissipate wear debris or heat.

- $\dot{V}$  = oil quantity
- D = outside bearing diameter
- ① Increasing oil quantity required for heat dissipation
- ② No heat dissipation necessary
- a = oil quantity sufficient for lubrication
- b = upper limit for bearings of symmetrical design
- c = upper limit for bearings of asymmetrical design
- a<sub>1</sub>; b<sub>1</sub>; c<sub>1</sub>: D/d > 1,5
- a<sub>2</sub>; b<sub>2</sub>; c<sub>2</sub>: D/d ≤ 1,5



*Figure 21*  
Oil quantities

# Lubrication

## Design of adjacent construction for oil lubrication

The lubrication holes in the housing and shaft must align with those in the rolling bearings. Adequate cross-sections must be provided for annular slots, pockets, etc.

The oil must be able to flow out without pressure (this prevents oil build-up and additional heating of the oil).

In axial bearings, the oil must always be fed from the inside to the outside.

## Outlet cross-section guide values for oil lubrication

The cross-section of the oil outlet hole should be significantly larger than that of the inlet, *Figure 22*.

The cross-section  $A_{rab}$  is dependent on the oil quantity and the viscosity:

$$A_{rab} = K_{ab} \cdot A_{ab}$$

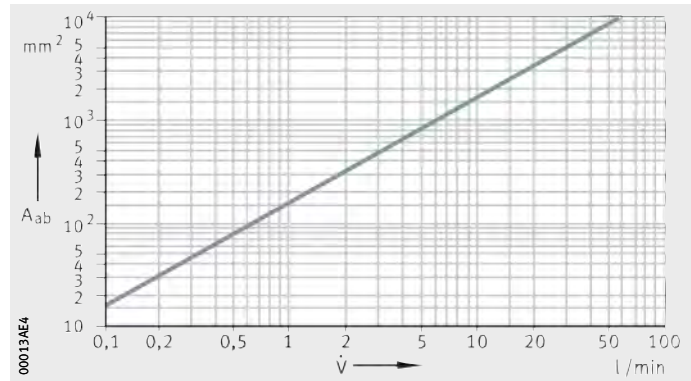
$A_{rab}$  mm<sup>2</sup>  
Outlet cross-section taking viscosity into consideration

$K_{ab}$  –  
Correction factor for viscosity, see table

$A_{ab}$  mm<sup>2</sup>  
Outlet cross-section, *Figure 22*.

$A_{ab}$  = cross-section for pressure-free oil runout  
 $\dot{V}$  = oil quantity

*Figure 22*  
Outlet cross-section (guide values)



## Correction factor $K_{ab}$

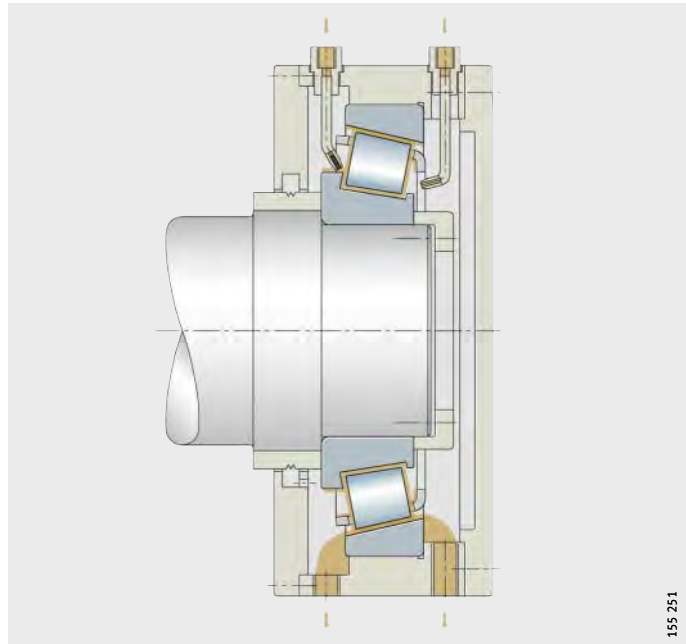
| Viscosity<br>mm <sup>2</sup> · s <sup>-1</sup> | Factor<br>$K_{ab}$ |
|--|--------------------|
| up to 30                                       | 1                  |
| 30 to 60                                       | 1,2 to 1,6         |
| 60 to 90                                       | 1,8 to 2,2         |
| 90 to 120                                      | 2,4 to 2,8         |
| 120 to 150                                     | 3 to 3,4           |



### Oil injection lubrication

In bearings running at high speeds, the oil is injected into the gap between the cage and bearing ring, *Figure 23*. Injection lubrication using large recirculation quantities is associated with high power loss.

Heating of the bearings can only be held within limits with a considerable amount of effort. The appropriate upper limit for the speed parameter  $n \cdot d_M = 1\,000\,000 \text{ min}^{-1} \cdot \text{mm}$  for recirculating lubrication with suitable bearings (for example spindle bearings) can be exceeded to a considerable degree when using injection lubrication.



*Figure 23*  
Oil injection lubrication  
(oil feed from both sides  
for tapered roller bearing running  
at high speeds)

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# Lubrication

## Heat dissipation by the lubricant

Oil can dissipate frictional heat from the bearing. It is possible to calculate the heat flow  $\dot{Q}_L$  that is dissipated with the lubricant and the necessary lubricant volume flow  $\dot{V}_L$ .

### Heat flow

$$\dot{Q} = 10^{-6} \cdot \frac{\pi}{30} \cdot n \cdot (M_0 + M_1) + \dot{Q}_E$$

$$\dot{Q}_L = \dot{Q} - \dot{Q}_S$$

### Approximate calculation

$$\dot{V}_L = \frac{\dot{Q}_L}{0,0286 \cdot \Delta\vartheta_L}$$

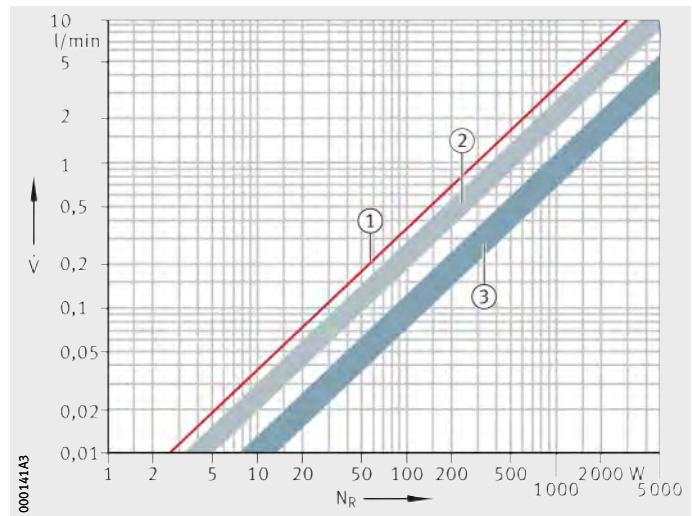
- $\dot{Q}_L$  kW  
Heat flow dissipated by the lubricant
- $\dot{Q}$  kW  
Total dissipated heat flow
- $\dot{Q}_S$  kW  
Heat flow dissipated via the bearing seating surfaces
- $\dot{Q}_E$  kW  
Heat flow due to heating by external source
- $n$  min<sup>-1</sup>  
Operating speed or equivalent speed
- $M_0$  Nmm  
Frictional torque as a function of speed
- $M_1$  Nmm  
Frictional torque as a function of load
- $\dot{V}_L$  l/min  
Lubricant volume flow
- $\Delta\vartheta_L$  K  
Difference between oil inlet and oil outlet temperature.

## Guide values for the oil quantity in cooling and lubrication

If these values cannot be calculated, the guide values according to *Figure 24* apply for the temperature difference of  $\Delta\vartheta_L = 10$  K.

- $\dot{V}$  = oil quantity
- $N_R$  = frictional power
- ① No account is taken of thermal conduction, radiation or convection
- ② Empirical values for normal cooling conditions
- ③ Empirical values for very good cooling conditions

*Figure 24*  
Guide values for the oil quantity in cooling and lubrication







### Oil changes

At temperatures in the bearing of less than +50 °C and with only slight contamination, an oil change once per year is generally sufficient.

Guide values for the oil change intervals are given in *Figure 25*.



The precise oil change intervals should be agreed in consultation with the oil manufacturer.

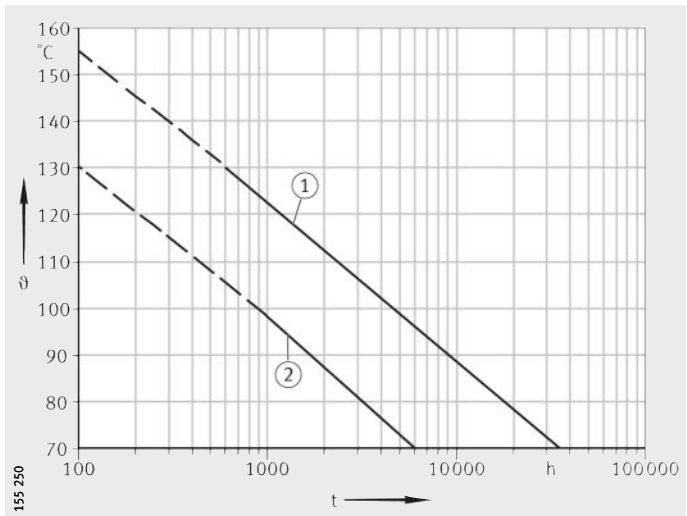
### Severe operating conditions

Under severe conditions, the oil should be changed more often. This applies, for example, in the case of higher temperatures and low oil quantities with a high circulation index.

The circulation index indicates how often the entire oil volume available is recirculated and pumped per hour:

$$\text{Circulation index} = \frac{\text{Pump displacement m}^3/\text{h}}{\text{Container volume m}^3}$$

- ϑ = oil sump temperature
  - t = oil change interval
  - ① Synthetic gearbox oils
  - ② Mineral gearbox oils
- Source: FVA Project No. 171



*Figure 25*  
Oil change intervals

# Bearing data

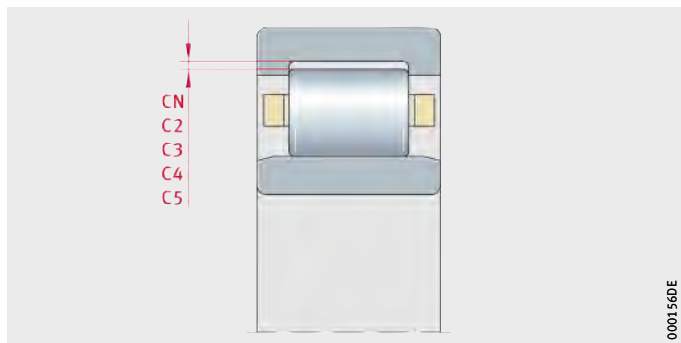
## Radial internal clearance

The radial internal clearance applies to bearings with an inner ring before the bearing is mounted. It is defined as the amount by which the inner ring can be moved in a radial direction from one extreme position to the other in relation to the outer ring, *Figure 1*.

In accordance with DIN 620-4, ISO 5 753, the radial internal clearance is divided into groups, *Figure 1* and table.

CN, C2, C3, C4, C5 = internal clearance groups

*Figure 1*  
Radial internal clearance



## Radial internal clearance groups

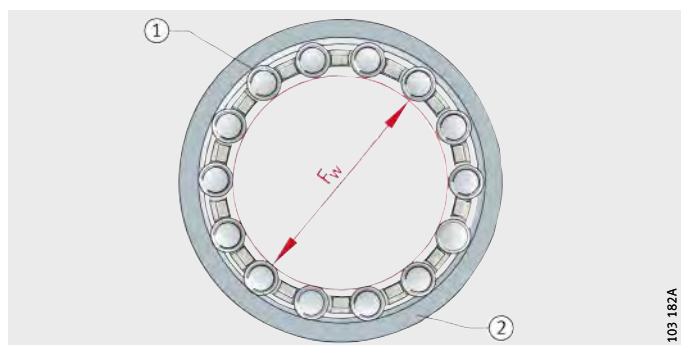
| Internal clearance group | Description  | Standard               | Application   |
|--------------------------|--|------------------------|---|
| CN                       | <ul style="list-style-type: none"> <li>Normal radial internal clearance</li> <li>CN is not included in bearing designations</li> </ul> | DIN 620-4<br>ISO 5 753 | For normal operating conditions with shaft and housing tolerances, see section Operating clearance value, page 97 |
| C2                       | <ul style="list-style-type: none"> <li>Internal clearance &lt; CN</li> </ul>   |                        | For heavy alternating loads combined with oscillating motion  |
| C3                       | <ul style="list-style-type: none"> <li>Internal clearance &gt; CN</li> </ul>   | ISO 5 753              | For bearing rings with press fits and large temperature differential between the inner and outer ring             |
| C4                       | <ul style="list-style-type: none"> <li>Internal clearance &gt; C3</li> </ul>   |                        |   |
| C5                       | <ul style="list-style-type: none"> <li>Internal clearance &gt; C4</li> </ul>   |                        |   |

## Enveloping circle

For bearings without an inner ring, the enveloping circle  $F_w$  is used. This is the inner inscribed circle of the cylindrical rollers in clearance-free contact with the outer raceway, *Figure 2*. Before the bearings are mounted, it is in the tolerance zone F6. Deviations for F6, see table, page 146.

- ① Cylindrical roller
  - ② Outer raceway
- $F_w$  = enveloping circle diameter

*Figure 2*  
Enveloping circle

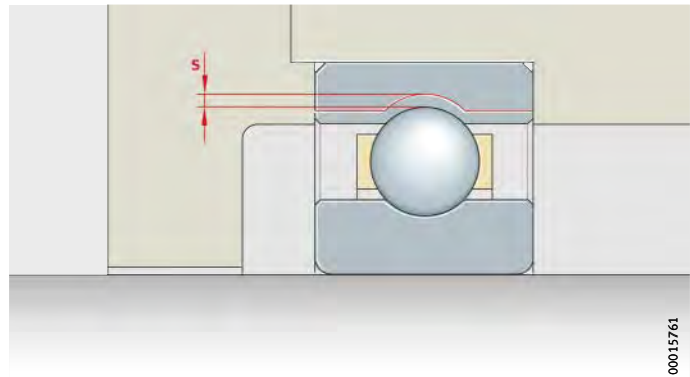




## Operating clearance

The operating clearance is determined on a mounted bearing still warm from operation. It is defined as the amount by which the shaft can be moved in a radial direction from one extreme position to the other, *Figure 3*.

The operating clearance is derived from the radial internal clearance and the change in the radial internal clearance as a result of interference fit and thermal influences in the mounted condition.



s = operating clearance

*Figure 3*  
Operating clearance

## Operating clearance value

The operating clearance value is dependent on the operating and installation conditions of the bearing, see also section Design of bearing arrangements, page 120.

A larger operating clearance is, for example, necessary if heat is transferred via the shaft, the shaft undergoes deflection or if misalignment occurs.

An operating clearance smaller than CN should only be used in special cases, for example in high precision bearing arrangements.

The normal operating clearance is achieved with internal clearance CN or, in larger bearings, predominantly with C3 if the recommended shaft and housing tolerances are fulfilled, see section Design of bearing arrangements, page 120.

## Calculation of operating clearance

The operating clearance is derived from:

$$s = s_r - \Delta s_p - \Delta s_T$$

|   |    |
|---|----|
| s   | μm |
| Radial operating clearance of mounted bearing warm from operation |    |
| s <sub>r</sub>  | μm |
| Radial internal clearance   |    |
| Δs <sub>p</sub>   | μm |
| Reduction in radial internal clearance due to fit                 |    |
| Δs <sub>T</sub>   | μm |
| Reduction in radial internal clearance due to temperature.        |    |

# Bearing data

## Reduction in radial internal clearance due to fit

The radial internal clearance is reduced due to the fit as a result of expansion of the inner ring and contraction of the outer ring:

$$\Delta s_p = \Delta d + \Delta D$$

$\Delta d$   $\mu\text{m}$

Expansion of the inner ring

$\Delta D$   $\mu\text{m}$

Contraction of the outer ring.

## Expansion of the inner ring

The expansion of the inner ring is calculated as follows:

$$\Delta d \approx 0,9 \cdot U \cdot d / F \approx 0,8 \cdot U$$

$d$   $\text{mm}$

Bore diameter of the inner ring

$U$   $\mu\text{m}$

Theoretical interference of the mounted parts with firm seating. The theoretical oversize of the mounted parts with a firm seating is determined from the mean deviations and the upper and lower deviations of the tolerance zones of the mounted parts reduced by  $1/3$  of their acceptable value. This must be reduced by the amount by which parts are smoothed during mounting

$F$   $\text{mm}$

Raceway diameter of the inner ring.



For very thin-walled housings and light metal housings, the reduction in the radial internal clearance must be determined by mounting trials.

## Contraction of the outer ring

The contraction of the outer ring is calculated as follows:

$$\Delta D \approx 0,8 \cdot U \cdot E / D \approx 0,7 \cdot U$$

$E$   $\text{mm}$

Raceway diameter of the outer ring

$D$   $\text{mm}$

Outside diameter of the outer ring.



### Reduction in radial internal clearance due to temperature

The radial internal clearance can alter considerably if there is a substantial temperature difference between the inner ring and outer ring.

$$\Delta s_T = \alpha \cdot d_M \cdot 1000 \cdot (\vartheta_{IR} - \vartheta_{AR})$$

$\Delta s_T$      $\mu\text{m}$   
Reduction in radial internal clearance due to temperature  
 $\alpha$      $\text{K}^{-1}$   
Coefficient of thermal expansion of steel:  $\alpha = 0,000011 \text{ K}^{-1}$   
 $d_M$      $\text{mm}$   
Mean bearing diameter  $(d + D)/2$   
 $\vartheta_{IR}$      $^{\circ}\text{C}, \text{K}$   
Temperature of the inner ring  
 $\vartheta_{AR}$      $^{\circ}\text{C}, \text{K}$   
Temperature of the outer ring  
(usual temperature difference between inner and outer ring: 5 K to 10 K).



Where shafts start up quickly, a larger radial internal clearance should be used since adequate thermal compensation between the bearing, shaft and housing does not occur in this situation.  $\Delta s_T$  can, in this case, be significantly higher in this case than for continuous operation.

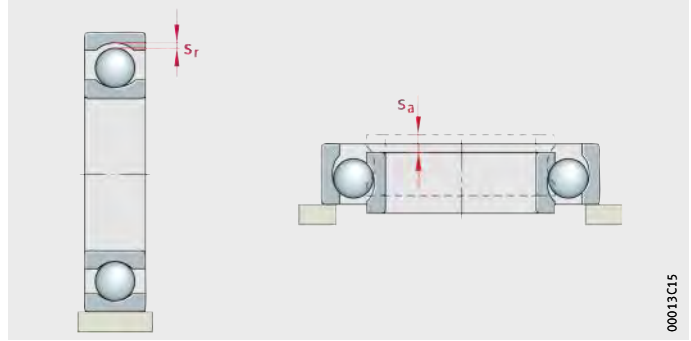
# Bearing data

## Axial internal clearance

The axial internal clearance  $s_a$  is the extent to which one bearing ring can be displaced in relation to the other, without load, along the bearing axis, *Figure 4*.

$s_a$  = axial internal clearance  
 $s_r$  = radiale internal clearance

*Figure 4*  
 Axial internal clearance  
 in comparison  
 with radial internal clearance



In various bearing types, there is a relationship between the radial internal clearance  $s_r$  and the axial internal clearance  $s_a$ . Guide values for the correlation between the radial and axial internal clearance are shown for some bearing types in the table.

### Correlation between axial internal clearance and radial internal clearance

| Bearing type                  | Ratio of axial internal clearance to radial internal clearance $\frac{s_a}{s_r}$ |                      |
|-------------------------------|--|----------------------|
| Spherical roller bearings     | $2,3 \cdot Y_0^{1)}$   |                      |
| Tapered roller bearings       | Single row, arranged in pairs  | $4,6 \cdot Y_0^{1)}$ |
|                               | Matched pairs (N11CA)  | $2,3 \cdot Y_0^{1)}$ |
| Angular contact ball bearings | Double row, contact angle $40^\circ$   | 2                    |
|                               | Single row Series 72...-B and 73...-B, arranged in pairs                         | 1,2                  |
| Four point contact bearings   | 1,4  |                      |

<sup>1)</sup>  $Y_0$  factor, see dimension tables.



### **Bearing materials**

INA and FAG rolling bearings fulfil the requirements for fatigue strength, wear resistance, hardness, toughness and structural stability.

The material used for the rings and rolling elements is generally a low alloy, through hardening chromium steel of high purity. For bearings subjected to considerable shock loads and reversed bending stresses, case hardening steel is also used (supplied by agreement).

In recent years, the improved quality of rolling bearing steels has been the principal factor in achieving considerable increases in basic load ratings.

The results of research as well as practical experience confirm that bearings made from the steel currently used as standard can achieve their endurance limit if loads are not excessively high and the lubrication and cleanliness conditions are favourable.

### **High Nitrogen Steel**

Special bearings made from HNS (High Nitrogen Steel, supplied by agreement) can achieve adequate life values even under the most challenging conditions (high temperatures, moisture, contamination).

### **High performance steels Cronidur and Cronitect®**

For increased performance requirements, highly corrosion-resistant, nitrogen-alloyed martensitic HNS steels are available such as Cronidur and the newly developed steel Cronitect®.

In contrast to Cronidur, the more economical alternative Cronitect® has nitrogen introduced into the structure by means of a surface layer hardening process.

Both steels are considerably superior in terms of corrosion and wear resistance as well as fatigue strength to the conventional corrosion-resistant steels for rolling bearings, see also TPI 64, Corrosion-resistant Products.

### **Ceramic materials**

Ceramic hybrid spindle bearings contain balls made from silicon nitride. These ceramic balls are substantially lighter than steel balls. The centrifugal forces and friction are significantly lower.

Hybrid bearings allow very high speeds, even with grease lubrication, as well as long operating life and low operating temperatures.

# Bearing data

## Materials and bearing components

The following table shows suitable materials and their application in bearing technology.

### Materials and bearing components

| Material  | Bearing components (example)               |
|---|--|
| Through hardening chromium steel<br>– rolling bearing steel to ISO 683-17 | Outer and inner ring, axial washer         |
| HNS<br>– High Nitrogen Steel  | Outer and inner ring                       |
| Corrosion-resistant steel<br>– rolling bearing steel to ISO 683-17        | Outer and inner ring                       |
| Case hardening steel  | For example, outer ring of back-up rollers |
| Silicon nitride   | Ceramic balls                              |
| Brass alloy   | Cage                                       |
| Aluminium alloy   | Cage                                       |
| NBR, FPM, PUR   | Sealing ring                               |

### Cages

The most important functions of the cage are:

- to separate the rolling elements from each other in order to minimise friction and heat generation
- to maintain the rolling elements at the same distance from each other in order to ensure uniform load distribution
- to prevent the rolling elements from falling out in bearings that can be dismantled or swivelled out
- to guide the rolling elements in the unloaded zone of the bearing.

Rolling bearing cages are subdivided into sheet metal and solid section cages.

### Sheet metal cages

These cages are predominantly made from steel and for some bearings from brass, *Figure 5*, page 103. In comparison with solid section cages made from metal, they are of lower mass.

Since a sheet metal cage only fills a small proportion of the gap between the inner and outer ring, lubricant can easily reach the interior of the bearing and is held on the cage.

In general, a sheet steel cage is only included in the bearing designation if it is not defined as a standard version of the bearing.





### Solid section cages

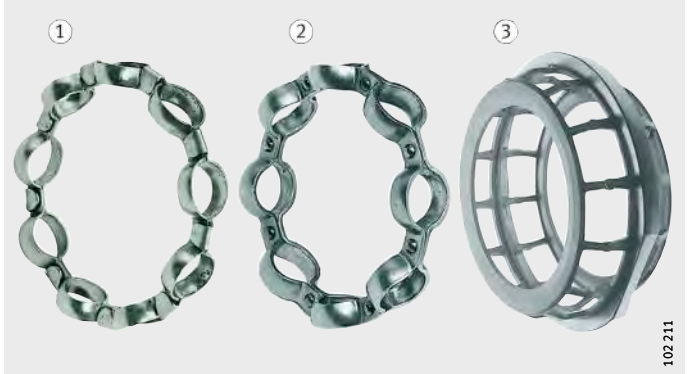
These cages are made from metal, laminated fabric or plastic, *Figure 6*. They can be identified from the bearing designation.

### Solid section cages made from metal or laminated fabric

Solid section cages made from metal are used where there are requirements for high cage strength and at high temperatures. Solid section cages are also used if the cage must be guided on ribs. Rib-guided cages for bearings running at high speeds are made in many cases from light materials such as light metal or laminated fabric in order to achieve low inertia forces.

### Cage designs

- ① Lug cage for deep groove ball bearings
- ② Riveted cage for deep groove ball bearings
- ③ Window cage for spherical roller bearings



*Figure 5*  
Sheet steel cages

- ① Riveted solid section cage for deep groove ball bearings
- ② Window cage for angular contact ball bearings
- ③ Riveted cage with crosspiece rivets for cylindrical roller cages



*Figure 6*  
Solid section brass cages

# Bearing data

## Guidance method

A further means of distinguishing between cages is their guidance method, *Figure 7*. Most cages are guided by the rolling elements and do not have a suffix for the guidance method.

If guidance is by the bearing outer ring, the suffix A is used.

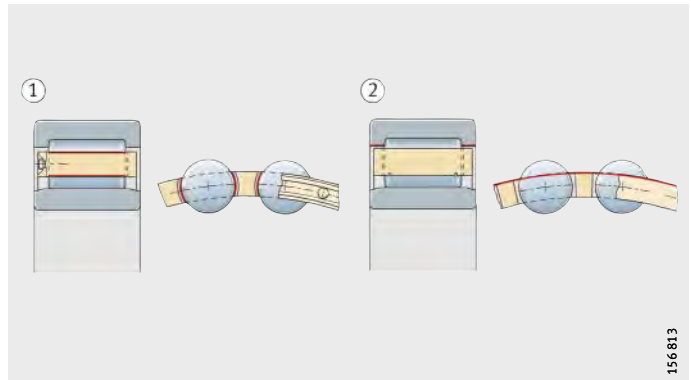
Cages that are guided on the inner ring have the suffix B.

Under normal operating conditions, the cage design defined as the standard cage is generally suitable. Standard cages that may differ within a bearing series according to the bearing size are described in the product sections.

Under special operating conditions, a cage that is suitable for the specific conditions must be selected.

- Rolling bearing cages:
- ① Guided by rolling elements
  - ② Guided by ribs

*Figure 7*  
Guidance of cages





## Operating temperature

Rolling bearings are thermally stabilised such that, depending on the bearing type, they are generally dimensionally stable up to +120 °C (certain series up to +150 °C).

Operating temperatures above +150 °C require special heat treatment. Bearings treated in this way are available by agreement and are identified by the suffixes S1, S2, S3 and S4 to DIN 623-1, see table.



The temperature data in the product descriptions must be observed.

### Suffixes for bearings for high temperatures

| Suffix                     | S1      | S2      | S3      | S4      |
|----------------------------|---------|---------|---------|---------|
| Max. operating temperature | +200 °C | +250 °C | +300 °C | +350 °C |

## Sealed bearings

The permissible temperature for sealed bearings is dependent on the requirements for the operating life of the grease filling and on the action of the contact seals.

Sealed bearings are greased with specially tested, high performance, high quality greases. These greases can withstand +120 °C for short periods. At long term temperatures of +70 °C and above, a reduction in the operating life of standard greases with a lithium soap base must be expected.

In many cases, adequate operating life values are only achieved at high temperatures through the use of special greases.

In these cases, it must also be checked whether seals made from especially heat-resistant materials must be used.

The operating limit of normal contact seals is +100 °C.



If high temperature synthetic materials are used for seals and greases, it must be noted that the particularly high performance materials containing fluoride may give off harmful gases and vapours when heated to approx. +300 °C and above. This may occur, for example, if a welding torch is used in the dismantling of a bearing.

High temperatures are critical especially in the case of seals made from fluoro elastomer (FKM, FPM, for example Viton) or fluoride-containing greases such as the rolling bearing greases Arcanol TEMP200 and greases to GA11. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the specific fluoride-containing material, which can be obtained upon request.

# Bearing data

## Anti-corrosion protection

Bearings are not resistant to corrosion by water or agents containing alkalis or acids but are often exposed to these corrosion-inducing agents. In such applications, anti-corrosion protection is therefore a decisive factor in achieving a long operating life of the bearings.

In principle, corrosion-resistant steels to ISO 693-17 can be used. These bearings have the prefix S. For higher requirements, it may be advisable to use the high performance steels Cronidur and Cronitect®, see page 101.

## Corrotect® coating

In many applications, the special coating Corrotect® is more cost-effective than corrosion-resistant steel.

Corrotect® is an extremely thin, electroplated surface coating (coating thickness 0,5 µm to 3 µm). The coating is effective against moisture, contaminated water, salt spray and weakly alkaline and weakly acidic cleaning agents.

## Advantages of the coating

The advantages of the special coating Corrotect® are all-round rust protection, including the turned surfaces of chamfers and radii, *Figure 8*. It also gives long term prevention of rust penetration beneath seals and smaller bright spots are protected against rust by the cathodic protection effect. In comparison with uncoated parts, operating life is significantly increased by the anti-corrosion protection. Uncoated bearings can be easily replaced by coated bearings of the same dimensions and there is no decrease in load carrying capacity (such as occurs in the use of corrosion-resistant steels). During storage, there is no need to use organic-based preservatives.

- ① With Corrotect® coating
- ② Uncoated

*Figure 8*  
Bearing rings  
after the salt spray test



## Mounting of coated bearings



Before bearings with Corrotect® coating are mounted, compatibility with the media should always be checked.

For lower press-in forces, the surface of the parts should be lightly greased; the tolerances are increased by the thickness of the coating.



### Dimensional and geometrical tolerances

Unless stated otherwise, the tolerances for radial rolling bearings correspond to DIN 620-2 (ISO 492), while the tolerances for axial rolling bearings correspond to DIN 620-3 (ISO 199), *Figure 9*.

The accuracy corresponds to tolerance class PN. For bearings with increased accuracy, the tolerances are restricted to the values of classes P6, P5, P4 and P2. Tolerance tables for the individual tolerance classes, see page 109 to page 115.

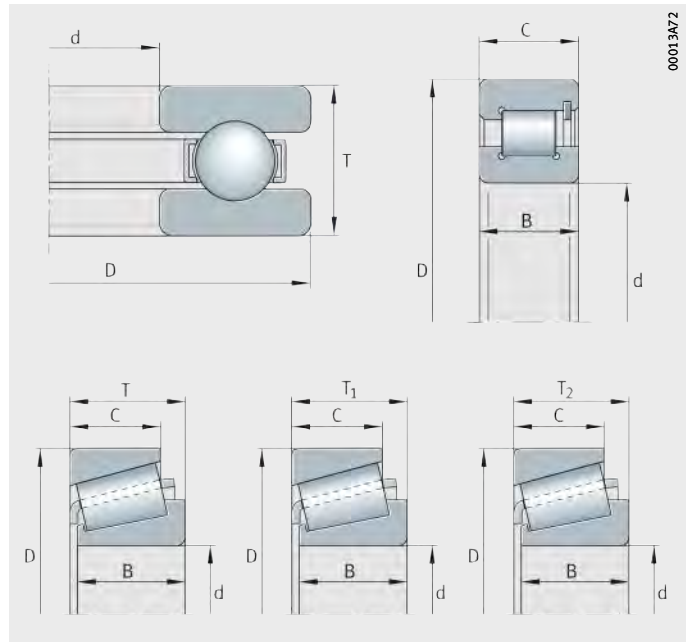
### High precision bearings

In addition to the standardised tolerance classes, high precision bearings are also produced in the tolerance classes P4S, SP and UP. These tolerances are listed in the product descriptions for the high precision bearings.

### Measurement methods

Measurement methods according to DIN 620-1 (ISO 1 132-2) are valid for the acceptance inspection of rolling bearings.

Further information on the measurement methods is given in TPI 138, Rolling Bearing Tolerances, Definitions and Measurement Principles. This TPI can be ordered via the Internet.



*Figure 9*  
Main dimensions to DIN 620

# Bearing data

## Dimensional and tolerance symbols

| Dimensional and tolerance symbols                | Toleranced characteristic to DIN 1 132 and DIN 620  |
|--|---|
| $d$  | Nominal bore diameter   |
| $\Delta_{dmp}$                                   | Deviation of mean bore diameter in a single plane   |
| $\Delta_{d1mp}$                                  | Deviation of mean large end diameter in tapered bores   |
| $V_{dsp}$  | Variation of single bore diameter in a single plane   |
| $V_{dmp}$  | Variation of mean bore diameter   |
| $D$  | Nominal outside diameter  |
| $\Delta_{Dmp}$                                   | Deviation of mean outside diameter in a single plane  |
| $V_{Dsp}$  | Variation of single outside diameter in a single plane  |
| $V_{Dmp}$  | Variation of mean outside diameter  |
| $B$  | Nominal inner ring width  |
| $\Delta_{Bs}$                                    | Deviation of a single inner ring width  |
| $V_{Bs}$   | Variation of inner ring width   |
| $C$  | Nominal outer ring width  |
| $\Delta_{Cs}$                                    | Deviation of a single outer ring width  |
| $V_{Cs}$   | Variation of outer ring width   |
| $K_{ia}$   | Radial runout of inner ring of assembled bearing  |
| $K_{ea}$   | Radial runout of outer ring of assembled bearing  |
| $S_d$  | Axial runout of inner ring face to the bore   |
| $S_D$  | Runout of outer ring outside surface generatrix to the face                                       |
| $S_{ia}$   | Axial runout of inner ring of assembled bearing   |
| $S_{ea}$   | Axial runout of outer ring of assembled bearing   |
| $S_i$  | Variation of washer thickness of shaft locating washer  |
| $S_e$  | Variation of washer thickness of housing locating washer  |
| $T$  | Nominal bearing height of a single direction axial bearing  |
| $T$  | Total width of tapered roller bearing   |
| $T_{1s}$   | Total width of tapered roller bearing over inner ring and normal outer ring measured at one point |
| $T_{2s}$   | Total width of tapered roller bearing over outer ring and normal inner ring measured at one point |
| $\Delta_{T_s}, \Delta_{T_{1s}}, \Delta_{T_{2s}}$ | Deviation in total width from nominal dimension of tapered roller bearing measured at one point   |



**Radial bearings, excluding tapered roller bearings**

**Tolerance class PN  
Inner ring  
Tolerances in  $\mu\text{m}$**

| d<br>mm |       | $\Delta_{\text{dmp}}$<br>Deviation |       | V <sub>dsp</sub><br>Diameter series |              |                 | V <sub>dmp</sub><br>max. | K <sub>ia</sub><br>max. |
|---------|-------|------------------------------------|-------|-------------------------------------|--------------|-----------------|--------------------------|-------------------------|
|         |       |                                    |       | 9<br>max.                           | 0, 1<br>max. | 2, 3, 4<br>max. |                          |                         |
| over    | incl. | upper                              | lower |                                     |              |                 |                          |                         |
| 120     | 180   | 0                                  | -25   | 31                                  | 31           | 19              | 19                       | 30                      |
| 180     | 250   | 0                                  | -30   | 38                                  | 38           | 23              | 23                       | 40                      |
| 250     | 315   | 0                                  | -35   | 44                                  | 44           | 26              | 26                       | 50                      |
| 315     | 400   | 0                                  | -40   | 50                                  | 50           | 30              | 30                       | 60                      |
| 400     | 500   | 0                                  | -45   | 56                                  | 56           | 34              | 34                       | 65                      |
| 500     | 630   | 0                                  | -50   | 63                                  | 63           | 38              | 38                       | 70                      |
| 630     | 800   | 0                                  | -75   | -                                   | -            | -               | -                        | 80                      |
| 800     | 1 000 | 0                                  | -100  | -                                   | -            | -               | -                        | 90                      |
| 1 000   | 1 250 | 0                                  | -125  | -                                   | -            | -               | -                        | 100                     |
| 1 250   | 1 600 | 0                                  | -160  | -                                   | -            | -               | -                        | 120                     |
| 1 600   | 2 000 | 0                                  | -200  | -                                   | -            | -               | -                        | 140                     |

**Tolerance class PN  
Inner ring  
continued  
Tolerances in  $\mu\text{m}$**

| d<br>mm |       | $\Delta_{\text{Bs}}$ |        |                                  |       | V <sub>Bs</sub><br>max. |
|---------|-------|----------------------|--------|----------------------------------|-------|-------------------------|
|         |       | Normal deviation     |        | Modified deviation <sup>1)</sup> |       |                         |
| over    | incl. | upper                | lower  | upper                            | lower |                         |
| 120     | 180   | 0                    | -250   | 0                                | -500  | 30                      |
| 180     | 250   | 0                    | -300   | 0                                | -500  | 30                      |
| 250     | 315   | 0                    | -350   | 0                                | -500  | 35                      |
| 315     | 400   | 0                    | -400   | 0                                | -630  | 40                      |
| 400     | 500   | 0                    | -450   | 0                                | -     | 50                      |
| 500     | 630   | 0                    | -500   | 0                                | -     | 60                      |
| 630     | 800   | 0                    | -750   | 0                                | -     | 70                      |
| 800     | 1 000 | 0                    | -1 000 | 0                                | -     | 80                      |
| 1 000   | 1 250 | 0                    | -1 250 | 0                                | -     | 100                     |
| 1 250   | 1 600 | 0                    | -1 600 | 0                                | -     | 120                     |
| 1 600   | 2 000 | 0                    | -2 000 | 0                                | -     | 140                     |

<sup>1)</sup> Only for bearings manufactured specifically for use as matched pairs.

## Bearing data

Tolerance class PN  
Outer ring<sup>1)</sup>  
Tolerances in  $\mu\text{m}$

| D<br>mm |       | $\Delta_{Dmp}$<br>Deviation |       | $V_{Dsp}$                        |      |         |   | $V_{Dmp}$ <sup>2)</sup> | $K_{ea}$ |
|---------|-------|-----------------------------|-------|----------------------------------|------|---------|---|-------------------------|----------|
|         |       |                             |       | Open bearings<br>Diameter series |      |         | Bearings<br>with sealing<br>shields and<br>sealing<br>washers |                         |          |
|         |       |                             |       | 9                                | 0, 1 | 2, 3, 4 |   |                         |          |
| over    | incl. | upper                       | lower | max.                             | max. | max.    | max.  |                         |          |
| 315     | 400   | 0                           | -40   | 50                               | 50   | 30      | -   | 30                      | 70       |
| 400     | 500   | 0                           | -45   | 56                               | 56   | 34      | -   | 34                      | 80       |
| 500     | 630   | 0                           | -50   | 63                               | 63   | 38      | -   | 38                      | 100      |
| 630     | 800   | 0                           | -75   | 94                               | 94   | 55      | -   | 55                      | 120      |
| 800     | 1 000 | 0                           | -100  | 125                              | 125  | 75      | -   | 75                      | 140      |
| 1 000   | 1 250 | 0                           | -125  | -                                | -    | -       | -   | -                       | 160      |
| 1 250   | 1 600 | 0                           | -160  | -                                | -    | -       | -   | -                       | 190      |
| 1 600   | 2 000 | 0                           | -200  | -                                | -    | -       | -   | -                       | 220      |
| 2 000   | 2 500 | 0                           | -250  | -                                | -    | -       | -   | -                       | 250      |

1)  $\Delta_{Cs}$ ,  $\Delta_{C1s}$ ,  $V_{Cs}$  and  $V_{C2s}$  are identical to  $\Delta_{Bs}$  and  $V_{Bs}$  for the inner ring of the corresponding bearing (table Tolerance class PN Inner ring, page 109).

2) Applies before assembly of the bearing and after removal of internal and/or external snap rings.





## Radial bearings, excluding tapered roller bearings

Tolerance class P6  
Inner ring  
Tolerances in  $\mu\text{m}$

| d    |       | $\Delta_{\text{dmp}}$ |       | $V_{\text{dsp}}$<br>Diameter series |      |         | $V_{\text{dmp}}$ | $K_{\text{ia}}$ |
|------|-------|-----------------------|-------|-------------------------------------|------|---------|------------------|-----------------|
| mm   |       | Deviation             |       | 9                                   | 0, 1 | 2, 3, 4 |                  |                 |
| over | incl. | upper                 | lower | max.                                | max. | max.    | max.             | max.            |
| 120  | 180   | 0                     | -18   | 23                                  | 23   | 14      | 14               | 18              |
| 180  | 250   | 0                     | -22   | 28                                  | 28   | 17      | 17               | 20              |
| 250  | 315   | 0                     | -25   | 31                                  | 31   | 19      | 19               | 25              |
| 315  | 400   | 0                     | -30   | 38                                  | 38   | 23      | 23               | 30              |
| 400  | 500   | 0                     | -35   | 44                                  | 44   | 26      | 26               | 35              |
| 500  | 630   | 0                     | -40   | 50                                  | 50   | 30      | 30               | 40              |

Tolerance class P6  
Inner ring  
continued  
Tolerances in  $\mu\text{m}$

| d    |       | $\Delta_{\text{Bs}}$ |       |                                  |       | $V_{\text{Bs}}$ |
|------|-------|----------------------|-------|----------------------------------|-------|-----------------|
| mm   |       | Normal deviation     |       | Modified deviation <sup>1)</sup> |       |                 |
| over | incl. | upper                | lower | upper                            | lower | max.            |
| 120  | 180   | 0                    | -250  | 0                                | -550  | 30              |
| 180  | 250   | 0                    | -300  | 0                                | -500  | 30              |
| 250  | 315   | 0                    | -350  | 0                                | -500  | 35              |
| 315  | 400   | 0                    | -400  | 0                                | -630  | 40              |
| 400  | 500   | 0                    | -450  | -                                | -     | 45              |
| 500  | 630   | 0                    | -500  | -                                | -     | 50              |

<sup>1)</sup> Only for bearings manufactured specifically for use as matched pairs.

Tolerance class P6  
Outer ring<sup>1)</sup>  
Tolerances in  $\mu\text{m}$

| D    |       | $\Delta_{\text{Dmp}}$ |       | $V_{\text{Dsp}}$                 |      |         |   | $V_{\text{Dmp}}^{2)}$ | $K_{\text{ea}}$ |
|------|-------|-----------------------|-------|----------------------------------|------|---------|---|-----------------------|-----------------|
| mm   |       | Deviation             |       | Open bearings<br>Diameter series |      |         | Bearings<br>with sealing<br>shields and<br>sealing<br>washers |                       |                 |
| over | incl. | upper                 | lower | 9                                | 0, 1 | 2, 3, 4 |   | max.                  | max.            |
| 315  | 400   | 0                     | -28   | 35                               | 35   | 21      | -   | 21                    | 35              |
| 400  | 500   | 0                     | -33   | 41                               | 41   | 25      | -   | 25                    | 40              |
| 500  | 630   | 0                     | -38   | 48                               | 48   | 29      | -   | 29                    | 50              |
| 630  | 800   | 0                     | -45   | 56                               | 56   | 34      | -   | 34                    | 60              |
| 800  | 1000  | 0                     | -60   | 75                               | 75   | 45      | -   | 45                    | 75              |

<sup>1)</sup>  $\Delta_{\text{Cs}}$ ,  $\Delta_{\text{C1s}}$ ,  $V_{\text{Cs}}$  and  $V_{\text{C2s}}$  are identical to  $\Delta_{\text{Bs}}$  and  $V_{\text{Bs}}$  for the inner ring of the corresponding bearing (table Tolerance class P6 Inner ring).

<sup>2)</sup> Applies before assembly of the bearing and after removal of internal and/or external snap rings.

## Bearing data

### Radial bearings, excluding tapered roller bearings

Tolerance class P5  
Inner ring  
Tolerances in  $\mu\text{m}$

| d    |       | $\Delta_{\text{dmp}}$ |       | $V_{\text{dsp}}$<br>Diameter series |               | $V_{\text{dmp}}$ | $K_{\text{ia}}$ | $S_{\text{d}}$ |
|------|-------|-----------------------|-------|-------------------------------------|---------------|------------------|-----------------|----------------|
| mm   |       | Deviation             |       | 9                                   | 0, 1, 2, 3, 4 |                  |                 |                |
| over | incl. | upper                 | lower | max.                                | max.          | max.             | max.            | max.           |
| 120  | 180   | 0                     | -13   | 13                                  | 10            | 7                | 8               | 10             |
| 180  | 250   | 0                     | -15   | 15                                  | 12            | 8                | 10              | 11             |
| 250  | 315   | 0                     | -18   | 18                                  | 14            | 9                | 13              | 13             |
| 315  | 400   | 0                     | -23   | 23                                  | 18            | 12               | 15              | 15             |

Tolerance class P5  
Inner ring  
continued  
Tolerances in  $\mu\text{m}$

| d    |       | $S_{\text{ia}}^{1)}$ | $\Delta_{\text{Bs}}$ |       |                                  |       | $V_{\text{Bs}}$ |
|------|-------|----------------------|----------------------|-------|----------------------------------|-------|-----------------|
| mm   |       |                      | Normal deviation     |       | Modified deviation <sup>2)</sup> |       |                 |
| over | incl. | max.                 | upper                | lower | upper                            | lower | max.            |
| 120  | 180   | 10                   | 0                    | -250  | 0                                | -380  | 8               |
| 180  | 250   | 13                   | 0                    | -300  | 0                                | -500  | 10              |
| 250  | 315   | 15                   | 0                    | -350  | 0                                | -500  | 13              |
| 315  | 400   | 20                   | 0                    | -400  | 0                                | -630  | 15              |

1) Only for deep groove and angular contact ball bearings.

2) Only for bearings manufactured specifically for use as matched pairs.

Tolerance class P5  
Outer ring<sup>1)</sup>  
Tolerances in  $\mu\text{m}$

| D    |       | $\Delta_{\text{Dmp}}$ |       | $V_{\text{Dsp}}^{2)}$<br>Diameter series |               | $V_{\text{Dmp}}^{3)}$ | $K_{\text{ea}}$ | $S_{\text{D}}$ | $S_{\text{ea}}^{4)}$ | $V_{\text{Cs}}$ |
|------|-------|-----------------------|-------|--|---------------|-----------------------|-----------------|----------------|----------------------|-----------------|
| mm   |       | Deviation             |       | 9  | 0, 1, 2, 3, 4 |                       |                 |                |                      |                 |
| over | incl. | upper                 | lower | max.                                     | max.          | max.                  | max.            | max.           | max.                 | max.            |
| 315  | 400   | 0                     | -20   | 20                                       | 15            | 10                    | 20              | 13             | -                    | 13              |
| 400  | 500   | 0                     | -23   | 23                                       | 17            | 12                    | 23              | 15             | -                    | 15              |
| 500  | 630   | 0                     | -28   | 28                                       | 21            | 14                    | 25              | 18             | -                    | 18              |
| 630  | 800   | 0                     | -35   | 35                                       | 26            | 18                    | 30              | 20             | -                    | 20              |

1)  $\Delta_{\text{Cs}}$  is identical to  $\Delta_{\text{Bs}}$  for the inner ring of the corresponding bearing (table Tolerance class P5 Inner ring).

2) No values are defined for radial ball bearings with sealing shields or sealing washers.

3) Applies before assembly of the bearing and after removal of internal and/or external snap rings.

4) Only for deep groove and angular contact ball bearings.



**Tolerances for tapered bores, taper 1:12**  
Tolerances in  $\mu\text{m}$

| Bore diameter |       | Tolerance class PN                           |       |                       |  |       |
|---------------|-------|--|-------|-----------------------|--|-------|
| d<br>mm       |       | $\Delta_{dmp}$<br>Deviation<br>$\mu\text{m}$ |       | $V_{dp}^{1)}$<br>max. | $\Delta_{d1mp} - \Delta_{dmp}$<br>Deviation<br>$\mu\text{m}$ |       |
| over          | incl. | upper  | lower |                       | upper  | lower |
| 120           | 180   | +40  | 0     | 31                    | +40  | 0     |
| 180           | 250   | +46  | 0     | 38                    | +46  | 0     |
| 250           | 315   | +52  | 0     | 44                    | +52  | 0     |
| 315           | 400   | +57  | 0     | 50                    | +57  | 0     |
| 400           | 500   | +63  | 0     | 56                    | +63  | 0     |
| 500           | 630   | +70  | 0     | –                     | +70  | 0     |
| 630           | 800   | +80  | 0     | –                     | +80  | 0     |
| 800           | 1 000 | +90  | 0     | –                     | +90  | 0     |
| 1 000         | 1 250 | +105   | 0     | –                     | +105   | 0     |
| 1 250         | 1 600 | +125   | 0     | –                     | +125   | 0     |
| 1 600         | 2 000 | +150   | 0     | –                     | +150   | 0     |

1) Valid in any radial cross-section of the bore.

**Tolerances for tapered bores, taper 1:30**  
Tolerances in  $\mu\text{m}$

| Bore diameter |       | Tolerance class PN                           |       |                       |  |       |
|---------------|-------|--|-------|-----------------------|--|-------|
| d<br>mm       |       | $\Delta_{dmp}$<br>Deviation<br>$\mu\text{m}$ |       | $V_{dp}^{1)}$<br>max. | $\Delta_{d1mp} - \Delta_{dmp}$<br>Deviation<br>$\mu\text{m}$ |       |
| over          | incl. | upper  | lower |                       | upper  | lower |
| 120           | 180   | +25  | 0     | 31                    | +50  | 0     |
| 180           | 250   | +30  | 0     | 38                    | +55  | 0     |
| 250           | 315   | +35  | 0     | 44                    | +60  | 0     |
| 315           | 400   | +40  | 0     | 50                    | +65  | 0     |
| 400           | 500   | +45  | 0     | 56                    | +75  | 0     |
| 500           | 630   | +50  | 0     | 63                    | +85  | 0     |
| 630           | 800   | +75  | 0     | –                     | +100   | 0     |
| 800           | 1 000 | +100   | 0     | –                     | +100   | 0     |
| 1 000         | 1 250 | +125   | 0     | –                     | +115   | 0     |
| 1 250         | 1 600 | +160   | 0     | –                     | +125   | 0     |
| 1 600         | 2 000 | +200   | 0     | –                     | +150   | 0     |

1) Valid in any radial cross-section of the bore.

Taper 1:12  
Half of taper angle  $\alpha = 2^{\circ}23' 9,4''$ ;  
theoretical large end diameter

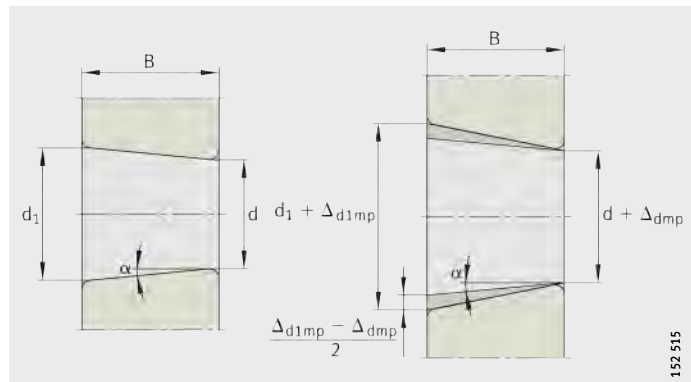
$$d_1 = d + \frac{1}{12} \times B$$

Taper 1:30  
Half of taper angle  $\alpha = 0^{\circ}57' 17,4''$ ;  
theoretical large end diameter

$$d_1 = d + \frac{1}{30} \times B$$

Figure 10

Tolerances for tapered bores



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# Bearing data

## Axial bearings

Bore diameter tolerances  
for shaft locating washers  
to ISO 199, DIN 620-3  
Tolerances in  $\mu\text{m}$

| d     |       | PN (normal tolerance),<br>P6 and P5 |       |                 | P4                                 |       |                 |
|-------|-------|-------------------------------------|-------|-----------------|------------------------------------|-------|-----------------|
| mm    |       | $\Delta_{\text{dmp}}$<br>Deviation  |       | $V_{\text{dp}}$ | $\Delta_{\text{dmp}}$<br>Deviation |       | $V_{\text{dp}}$ |
| over  | incl. | upper                               | lower | max.            | upper                              | lower | max.            |
| 120   | 180   | 0                                   | -25   | 19              | 0                                  | -18   | 14              |
| 180   | 250   | 0                                   | -30   | 23              | 0                                  | -22   | 17              |
| 250   | 315   | 0                                   | -35   | 26              | 0                                  | -25   | 19              |
| 315   | 400   | 0                                   | -40   | 30              | 0                                  | -30   | 23              |
| 400   | 500   | 0                                   | -45   | 34              | 0                                  | -35   | 26              |
| 500   | 630   | 0                                   | -50   | 38              | 0                                  | -40   | 30              |
| 630   | 800   | 0                                   | -75   | 56              | 0                                  | -50   | -               |
| 800   | 1 000 | 0                                   | -100  | 75              | 0                                  | -     | -               |
| 1 000 | 1 250 | 0                                   | -125  | 95              | 0                                  | -     | -               |

Outside diameter tolerances  
for housing locating washers  
to ISO 199, DIN 620-3  
Tolerances in  $\mu\text{m}$

| D     |       | PN (normal tolerance),<br>P6 and P5 |       |                 | P4                                 |       |                 |
|-------|-------|-------------------------------------|-------|-----------------|------------------------------------|-------|-----------------|
| mm    |       | $\Delta_{\text{Dmp}}$<br>Deviation  |       | $V_{\text{Dp}}$ | $\Delta_{\text{Dmp}}$<br>Deviation |       | $V_{\text{Dp}}$ |
| over  | incl. | upper                               | lower | max.            | upper                              | lower | max.            |
| 315   | 400   | 0                                   | -40   | 30              | 0                                  | -28   | 21              |
| 400   | 500   | 0                                   | -45   | 34              | 0                                  | -33   | 25              |
| 500   | 630   | 0                                   | -50   | 38              | 0                                  | -38   | 29              |
| 630   | 800   | 0                                   | -75   | 55              | 0                                  | -45   | 34              |
| 800   | 1 000 | 0                                   | -100  | 75              | -                                  | -     | -               |
| 1 000 | 1 250 | 0                                   | -125  | 75              | -                                  | -     | -               |
| 1 250 | 1 600 | 0                                   | -160  | 120             | -                                  | -     | -               |

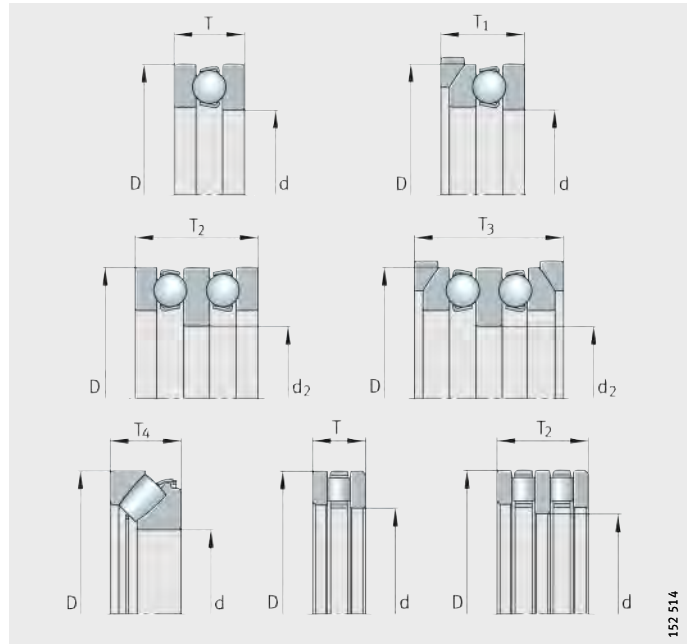
Variation in washer thickness  
for shaft and  
housing locating washers  
Tolerances in  $\mu\text{m}$

| d     |       | $S_i$                       |      |      |      | $S_e$<br>PN<br>(normal tolerance),<br>P6, P5, P4                                       |
|-------|-------|-----------------------------|------|------|------|--|
| mm    |       | PN<br>(normal<br>tolerance) | P6   | P5   | P4   |  |
| over  | incl. | max.                        | max. | max. | max. | Identical to $S_i$ for the<br>shaft locating washer<br>of the corresponding<br>bearing |
| 120   | 180   | 15                          | 9    | 5    | 4    |  |
| 180   | 250   | 20                          | 10   | 5    | 4    |  |
| 250   | 315   | 25                          | 13   | 7    | 5    |  |
| 315   | 400   | 30                          | 15   | 7    | 5    |  |
| 400   | 500   | 30                          | 18   | 9    | 6    |  |
| 500   | 630   | 35                          | 21   | 11   | 7    |  |
| 630   | 800   | 40                          | 25   | 13   | 8    |  |
| 800   | 1 000 | 45                          | 30   | 15   | 8    |  |
| 1 000 | 1 250 | 50                          | 35   | 18   | 9    |  |



**Tolerances for nominal bearing height**

These tolerances are given in the tables. The corresponding dimensional symbols are shown in *Figure 11*.



*Figure 11*  
Tolerances for nominal bearing height

**Tolerances for nominal bearing height**  
Tolerances in  $\mu\text{m}$

| d<br>mm |       | T<br>Deviation |        | T <sub>1</sub><br>Deviation |        | T <sub>2</sub><br>Deviation |        |
|---------|-------|----------------|--------|-----------------------------|--------|-----------------------------|--------|
| over    | incl. | upper          | lower  | upper                       | lower  | upper                       | lower  |
| 120     | 180   | 25             | -400   | 150                         | -400   | 200                         | -600   |
| 180     | 250   | 30             | -400   | 150                         | -400   | 250                         | -600   |
| 250     | 315   | 40             | -400   | 200                         | -400   | 350                         | -700   |
| 315     | 400   | 40             | -500   | 200                         | -500   | 350                         | -700   |
| 400     | 500   | 50             | -500   | 300                         | -500   | 400                         | -900   |
| 500     | 630   | 60             | -600   | 350                         | -600   | 500                         | -1 100 |
| 630     | 800   | 70             | -750   | 400                         | -750   | 600                         | -1 300 |
| 800     | 1 000 | 80             | -1 000 | 450                         | -1 000 | 700                         | -1 500 |
| 1 000   | 1 250 | 100            | -1 400 | 500                         | -1 400 | 900                         | -1 800 |

**Tolerances for nominal bearing height**  
continued  
Tolerances in  $\mu\text{m}$

| d<br>mm |       | T <sub>3</sub><br>Deviation |        | T <sub>4</sub><br>Deviation |        |
|---------|-------|-----------------------------|--------|-----------------------------|--------|
| over    | incl. | upper                       | lower  | upper                       | lower  |
| 120     | 180   | 400                         | -600   | 25                          | -500   |
| 180     | 250   | 500                         | -600   | 30                          | -500   |
| 250     | 315   | 600                         | -700   | 40                          | -700   |
| 315     | 400   | 600                         | -700   | 40                          | -700   |
| 400     | 500   | 750                         | -900   | 50                          | -900   |
| 500     | 630   | 900                         | -1 100 | 60                          | -1 200 |
| 630     | 800   | 1 100                       | -1 300 | 70                          | -1 400 |
| 800     | 1 000 | 1 300                       | -1 500 | 80                          | -1 800 |
| 1 000   | 1 250 | 1 600                       | -1 800 | 100                         | -2 400 |

# Bearing data

## Chamfer dimensions

### Radial bearings, excluding tapered roller bearings

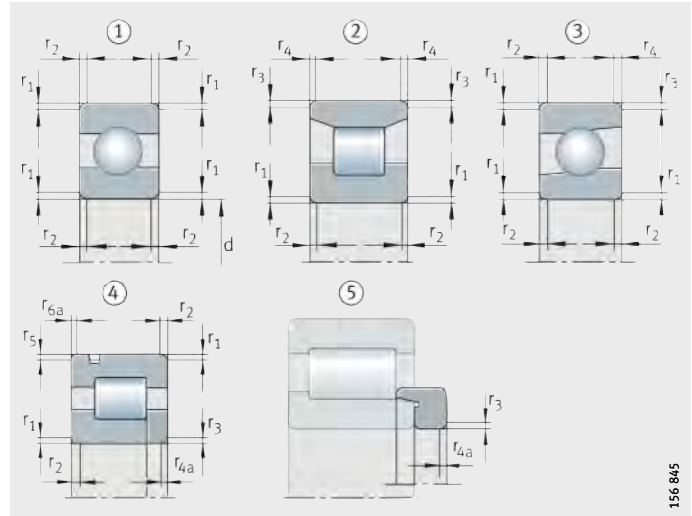
The chamfer dimensions correspond to DIN 620-6.

For minimum and maximum bearing values, *Figure 12* and table Limit values for chamfer dimensions to DIN 620-6 Values in mm, page 117.

For chamfer dimensions of tapered roller bearings see page 118, for axial bearings see page 119.

- ① Symmetrical ring cross-section with identical chamfers on both rings
- ② Symmetrical ring cross-section with different chamfers on both rings
- ③ Asymmetrical ring cross-section
- ④ Annular slot on outer ring, bearing with rib washer
- ⑤ L-section ring

*Figure 12*  
Chamfer dimensions  
for radial bearings  
excluding tapered roller bearings



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**Limit values  
for chamfer dimensions  
to DIN 620-6  
Values in mm**

| r <sup>1)</sup> | d    |       | r <sub>1</sub> to r <sub>6a</sub> | r <sub>1</sub> , r <sub>3</sub> , r <sub>5</sub> | r <sub>2</sub> , r <sub>4</sub> , r <sub>6</sub> <sup>2)</sup> | r <sub>4a</sub> , r <sub>6a</sub> |
|-----------------|------|-------|-----------------------------------|--|--|-----------------------------------|
|                 | over | incl. | min.                              | max.   | max.   | max.                              |
| 1               | 50   | –     | 1                                 | 1,9  | 3  | 2,2                               |
| 1,1             | 120  | –     | 1,1                               | 2,5  | 4  | 2,7                               |
| 1,5             | 120  | –     | 1,5                               | 3  | 5  | 3,5                               |
| 2               | 80   | 220   | 2                                 | 3,5  | 5  | 4                                 |
|                 | 220  | –     | 2                                 | 3,8  | 6  | 4                                 |
| 2,1             | –    | 280   | 2,1                               | 4  | 6,5  | 4,5                               |
|                 | 280  | –     | 2,1                               | 4,5  | 7  | 4,5                               |
| 2,5             | 100  | 280   | 2,5                               | 4,5  | 6  | 5                                 |
|                 | 280  | –     | 2,5                               | 5  | 7  | 5                                 |
| 3               | –    | 280   | 3                                 | 5  | 8  | 5,5                               |
|                 | 280  | –     | 3                                 | 5,5  | 8  | 5,5                               |
| 4               | –    | –     | 4                                 | 6,5  | 9  | 6,5                               |
| 5               | –    | –     | 5                                 | 8  | 10   | 8                                 |
| 6               | –    | –     | 6                                 | 10   | 13   | 10                                |
| 7,5             | –    | –     | 7,5                               | 12,5   | 17   | 12,5                              |
| 9,5             | –    | –     | 9,5                               | 15   | 19   | 15                                |
| 12              | –    | –     | 12                                | 18   | 24   | 18                                |
| 15              | –    | –     | 15                                | 21   | 30   | 21                                |
| 19              | –    | –     | 19                                | 25   | 38   | 25                                |

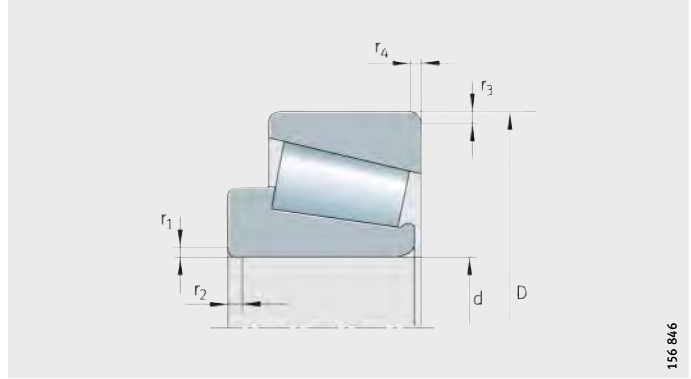
<sup>1)</sup> The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r<sub>min</sub>.

<sup>2)</sup> For bearings with a width of 2 mm or less, the values for r<sub>1</sub> apply.

# Bearing data

## Tapered roller bearings

For minimum and maximum values for metric tapered roller bearings, *Figure 13* and table.



*Figure 13*  
Chamfer dimensions  
for metric tapered roller bearings

**Limit values  
for chamfer dimensions**  
Values in mm

| r <sup>1)</sup> | d, D |       | r <sub>1</sub> to r <sub>4</sub> | r <sub>1</sub> , r <sub>3</sub> | r <sub>2</sub> , r <sub>4</sub> |
|-----------------|------|-------|----------------------------------|---------------------------------|---------------------------------|
|                 | over | incl. | min.                             | max.                            | max.                            |
| 1               | 50   | –     | 1                                | 1,9                             | 3                               |
| 1,5             | 120  | 250   | 1,5                              | 2,8                             | 3,5                             |
|                 | 250  | –     | 1,5                              | 3,5                             | 4                               |
| 2               | 120  | 250   | 2                                | 3,5                             | 4,5                             |
|                 | 250  | –     | 2                                | 4                               | 5                               |
| 2,5             | 120  | 250   | 2,5                              | 4                               | 5,5                             |
|                 | 250  | –     | 2,5                              | 4,5                             | 6                               |
| 3               | 120  | 250   | 3                                | 4,5                             | 6,5                             |
|                 | 250  | 400   | 3                                | 5                               | 7                               |
|                 | 400  | –     | 3                                | 5,5                             | 7,5                             |
| 4               | 120  | 250   | 4                                | 5,5                             | 7,5                             |
|                 | 250  | 400   | 4                                | 6                               | 8                               |
|                 | 400  | –     | 4                                | 6,5                             | 8,5                             |
| 5               | –    | 180   | 5                                | 6,5                             | 8                               |
|                 | 180  | –     | 5                                | 7,5                             | 9                               |
| 6               | –    | 180   | 6                                | 7,5                             | 10                              |
|                 | 180  | –     | 6                                | 9                               | 11                              |

<sup>1)</sup> The nominal chamfer dimension  $r$  is identical to the smallest permissible chamfer dimension  $r_{\min}$ .





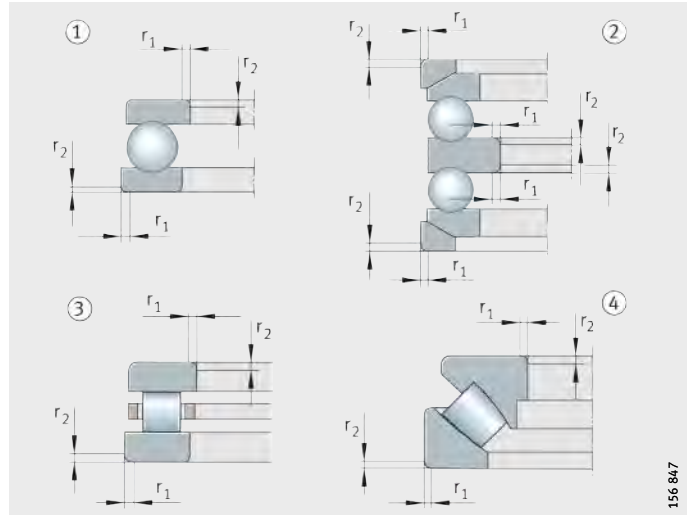
## Axial bearings

For minimum and maximum bearing values, *Figure 14* and table. The table corresponds to DIN 620-6.

With axial ball bearings, the tolerances for the chamfer dimensions are identical in both axial and radial directions.

- ① Single direction axial deep groove ball bearing with flat housing locating washer
- ② Double direction axial deep groove ball bearing with spherical housing locating washers and seating washers
- ③ Single direction axial cylindrical roller bearing
- ④ Single direction axial spherical roller bearing

*Figure 14*  
Chamfer dimensions  
for axial bearings



### Limit values for chamfer dimensions Values in mm

| r <sup>1)</sup> | r <sub>1</sub> , r <sub>2</sub> |      |
|-----------------|---------------------------------|------|
|                 | min.                            | max. |
| 1,5             | 1,5                             | 3,5  |
| 2               | 2                               | 4    |
| 2,1             | 2,1                             | 4,5  |
| 3               | 3                               | 5,5  |
| 4               | 4                               | 6,5  |
| 5               | 5                               | 8    |
| 6               | 6                               | 10   |
| 7,5             | 7,5                             | 12,5 |
| 9,5             | 9,5                             | 15   |
| 12              | 12                              | 18   |
| 15              | 15                              | 21   |
| 19              | 19                              | 25   |

<sup>1)</sup> The nominal chamfer dimension  $r$  is identical to the smallest permissible chamfer dimension  $r_{\min}$ .

# Design of bearing arrangements

## Selection of bearing arrangement

The guidance and support of a rotating shaft requires at least two bearings arranged at a certain distance from each other. Depending on the application, a decision is made between a locating/non-locating bearing arrangement, an adjusted bearing arrangement and a floating bearing arrangement.

## Locating/non-locating bearing arrangement

On a shaft supported by two radial bearings, the distances between the bearing seats on the shaft and in the housing frequently do not coincide as a result of manufacturing tolerances. The distances may also change as a result of temperature increases during operation. These differences in distance are compensated in the non-locating bearing. Examples of locating/non-locating bearing arrangements, *Figure 1*, page 122 to *Figure 4*, page 123.

## Non-locating bearings

Ideal non-locating bearings are cylindrical roller bearings with cage N and NU, *Figure 1* ②, page 122. In these bearings, the roller and cage assembly can be displaced on the raceway of the bearing ring without ribs.

All other bearing types, for example deep groove ball bearings and spherical roller bearings, can only act as non-locating bearings if one bearing ring has a fit that allows displacement, *Figure 2*, page 122. The bearing ring subjected to point load therefore has a loose fit; this is normally the outer ring, see section Conditions of rotation, page 128.



**Locating bearings** The locating bearing guides the shaft in an axial direction and supports external axial forces. In order to prevent axial stresses, shafts with more than two bearings have only one locating bearing. The type of bearing selected as a locating bearing depends on the magnitude of the axial forces and the accuracy with which the shafts must be axially guided.

A double row angular contact ball bearing, *Figure 3* ①, page 122, for example, will give closer axial guidance than a deep groove ball bearing or a spherical roller bearing. A pair of symmetrically arranged angular contact ball bearings or tapered roller bearings, *Figure 4*, page 123, used as locating bearings will provide extremely close axial guidance.

There are particular advantages in using angular contact ball bearings of the universal design, *Figure 5*, page 123. The bearings can be mounted in pairs in any O or X arrangement without shims. Angular contact ball bearings of the universal design are matched such that, when mounted in an X or O arrangement, they have slight axial internal clearance (design UA), are clearance-free (UO) or have slight preload (UL).

Spindle bearings of the universal design UL, *Figure 6*, page 123 have slight preload when mounted in an X or O arrangement (designs with greater preload are available by agreement).

In gearboxes, a four point contact bearing is sometimes mounted directly adjacent to a cylindrical roller bearing to give a locating bearing arrangement, *Figure 3* ③, page 122. The four point contact bearing, without radial support of the outer ring, can only support axial forces. The radial force is supported by the cylindrical roller bearing.

If a lower axial force is present, a cylindrical roller bearing with cage NUP can also be used as a locating bearing, *Figure 4* ③, page 123.

**No adjustment or setting work  
with matched pairs  
of tapered roller bearings**

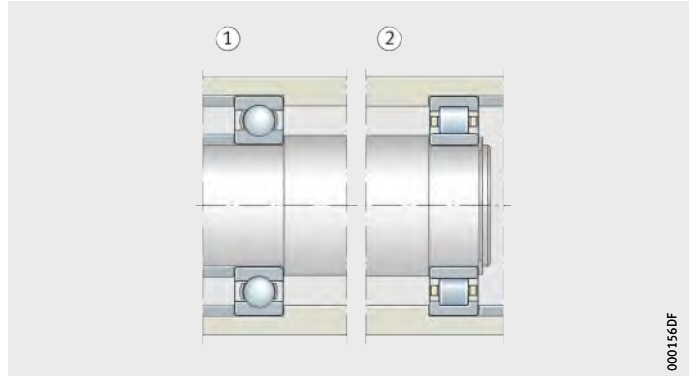
Mounting is also made easier when using matched pairs of tapered roller bearings as locating bearings (N11CA), *Figure 7* ②, page 123. They are matched with appropriate axial internal clearance such that no adjustment or setting work is required.

# Design of bearing arrangements

## Examples of locating/non-locating bearing arrangements

- Deep groove ball bearing:  
 ① Locating bearing  
 Cylindrical roller bearing NU:  
 ② Non-locating bearing

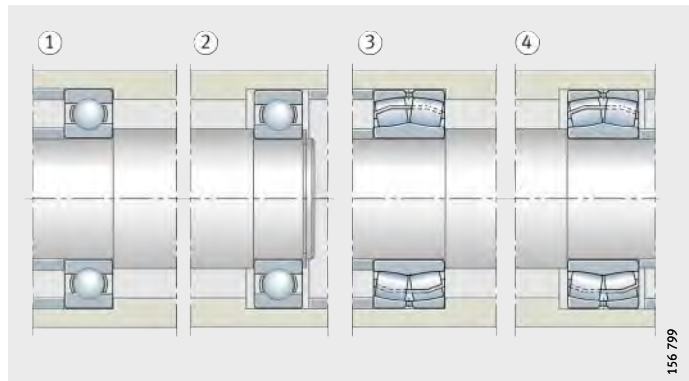
*Figure 1*  
 Locating/non-locating bearing arrangements



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- Deep groove ball bearings:  
 ① Locating bearing  
 ② Non-locating bearing  
 Spherical roller bearings:  
 ③ Locating bearing  
 ④ Non-locating bearing

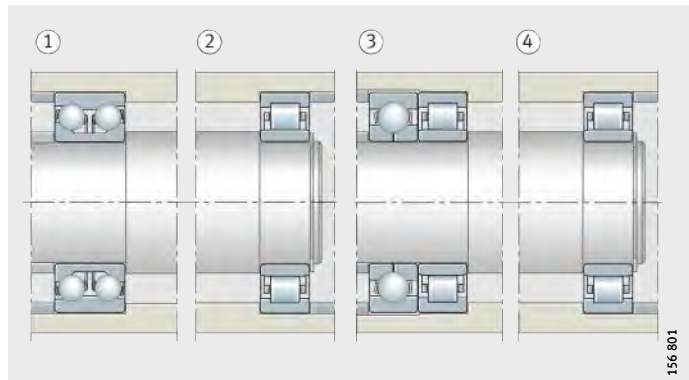
*Figure 2*  
 Locating/non-locating bearing arrangements



156 799

- Double row angular contact ball bearing:  
 ① Locating bearing  
 Cylindrical roller bearing NU:  
 ② Non-locating bearing  
 Four point contact bearing and cylindrical roller bearing:  
 ③ Locating bearing  
 Cylindrical roller bearing NU:  
 ④ Non-locating bearing

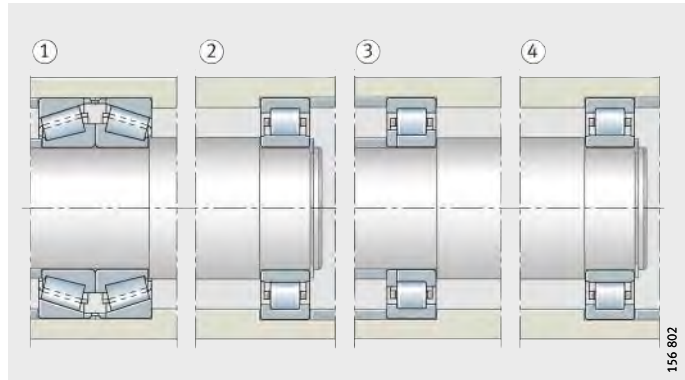
*Figure 3*  
 Locating/non-locating bearing arrangements



156 801

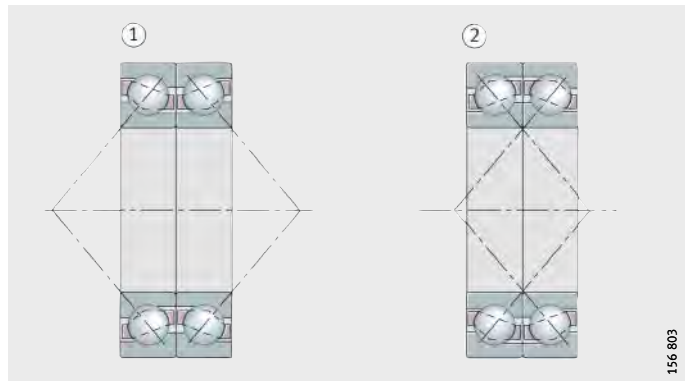


- Two tapered roller bearings:  
 ① Locating bearing  
 Cylindrical roller bearing NU:  
 ② Non-locating bearing  
 Cylindrical roller bearing NUP:  
 ③ Locating bearing  
 Cylindrical roller bearing NU:  
 ④ Non-locating bearing



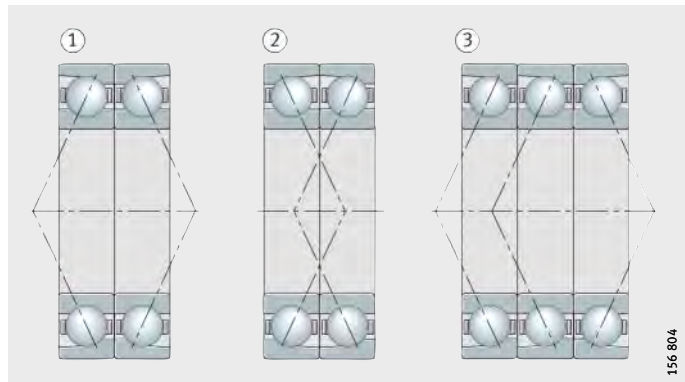
*Figure 4*  
 Locating/non-locating bearing arrangements

- Pair of angular contact ball bearings of universal design:  
 ① O arrangement  
 ② X arrangement



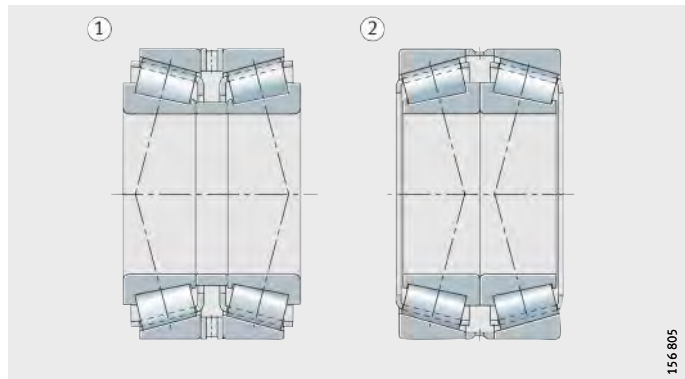
*Figure 5*  
 Locating bearing arrangements

- Spindle bearings of universal design:  
 ① O arrangement  
 ② X arrangement  
 ③ Tandem O arrangement



*Figure 6*  
 Locating bearing arrangements

- Pair of tapered roller bearings:  
 ① O arrangement  
 ② X arrangement



*Figure 7*  
 Locating bearing arrangements

# Design of bearing arrangements

## Adjusted bearing arrangement

These bearing arrangements normally consist of two symmetrically arranged angular contact ball bearings or tapered roller bearings, *Figure 8*. During mounting, one bearing ring is displaced on its seat until the bearing arrangement achieves the required clearance or the necessary preload.

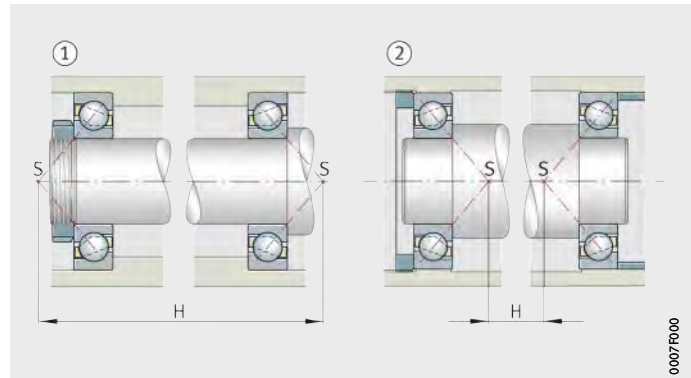
### Area of application

Due to this adjustment facility, the adjusted bearing arrangement is particularly suitable where close guidance is required, for example in pinion bearing arrangements with spiral toothed bevel gears and spindle bearing arrangements in machine tools.

### X and O arrangements

A fundamental distinction is drawn between the O arrangement, *Figure 8* ①, and the X arrangement, *Figure 8* ②, of the bearings. In the O arrangement, the cones and their apexes S formed by the pressure lines point outwards, in the X arrangement they point inwards. The support base H, in other words the distance between the apexes of the pressure cones, is larger in the O arrangement than in the X arrangement. The O arrangement therefore gives the lower tilting clearance.

Angular contact ball bearings  
 ① O arrangement  
 ② X arrangement  
 S = apexes of the pressure cones  
 H = support distance

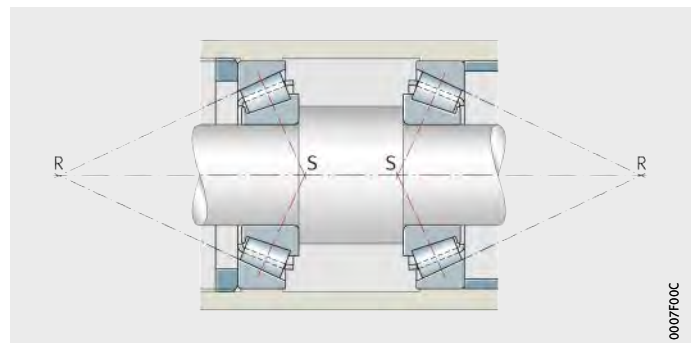


*Figure 8*  
Adjusted bearing arrangement

### Influence of thermal expansion in an X or O arrangement

When setting the axial internal clearance, thermal expansion must be taken into consideration. In the X arrangement, *Figure 9*, a temperature differential between the shaft and housing always leads to a reduction in internal clearance (preconditions: shaft and housing of identical material, inner ring and complete shaft at identical temperature, outer ring and complete housing at identical temperature).

Tapered roller bearings  
 X arrangement  
 S = apexes of the pressure cones  
 R = roller cone apexes



*Figure 9*  
Adjusted bearing arrangement

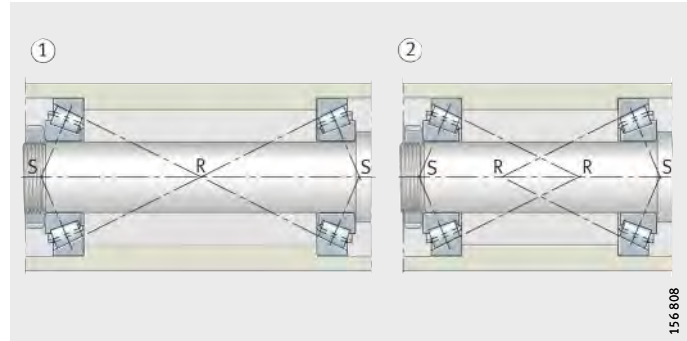


In the O arrangement, a distinction is drawn between three cases:

- The roller cone apexes R, i.e. the intersection points of the extended outer ring raceway with the bearing axis, coincide: the required internal clearance is achieved, *Figure 10* ①.
- The roller cones overlap if there is a short distance between the bearings: the axial internal clearance is reduced, *Figure 10* ②.
- The roller cones do not meet if there is a large distance between the bearings: the axial internal clearance is increased, *Figure 11*.

Tapered roller bearings in O arrangement

- ① Intersection points coincide
  - ② Intersection points overlap
- S = apexes of the pressure cones  
R = roller cone apexes

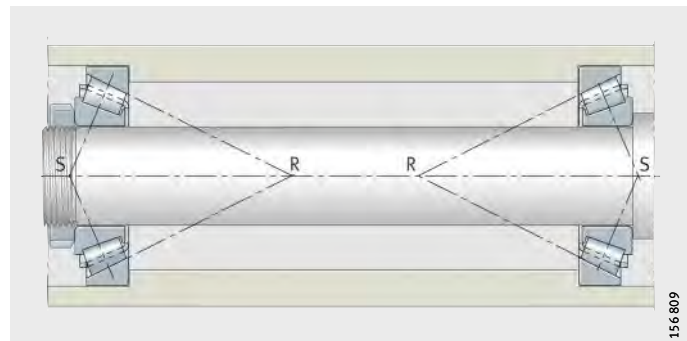


*Figure 10*

Adjusted bearing arrangement

Tapered roller bearings in O arrangement,  
without overlapping of  
roller cone apexes

- S = apexes of the pressure cones
- R = roller cone apexes



*Figure 11*

Adjusted bearing arrangement

# Design of bearing arrangements

## Floating bearing arrangement

The floating bearing arrangement is an economical solution where close axial guidance of the shaft is not required, *Figure 12*. The construction is similar to that of the adjusted bearing arrangement.

In the floating bearing arrangement, however, the shaft can be displaced in relation to the housing to the extent of the axial clearance  $s$ . The value  $s$  is defined as a function of the required guidance accuracy such that the bearings are not axially stressed even under unfavourable thermal conditions.

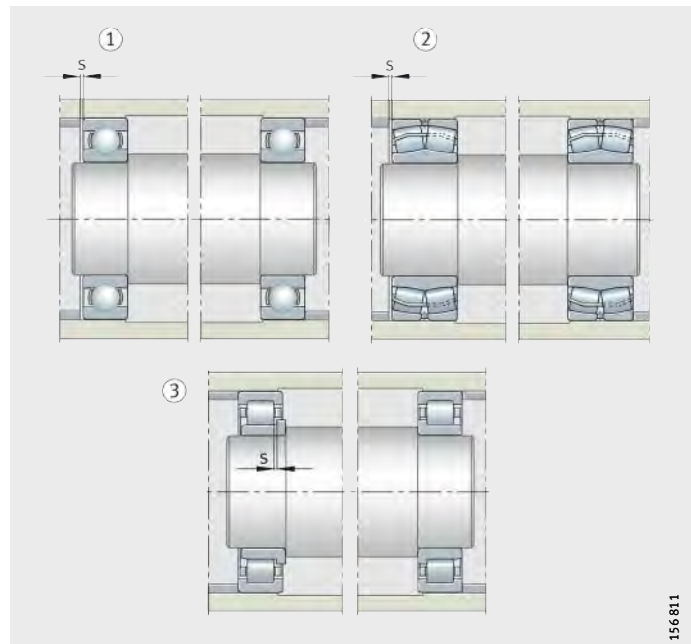
## Suitable bearings

Suitable bearing types for the floating bearing arrangement include deep groove ball bearings, self-aligning ball bearings and spherical roller bearings.

In both bearings, one ring, usually an outer ring, has a fit that allows displacement.

In floating bearing arrangements and cylindrical roller bearings with cage NJ, the length compensation takes place within the bearings. The inner and outer rings can have tight fits, *Figure 12* ③.

Tapered roller bearings and angular contact ball bearings are not suitable for a floating bearing arrangement, since they must be adjusted in order to run correctly.



*Figure 12*  
Floating bearing arrangements





**Fits** Rolling bearings are located on the shaft and in the housing in a radial, axial and tangential direction in accordance with their function. Radial and tangential location is normally achieved by force locking, i.e. by tight fits on the bearing rings. Axial location of the bearings is normally achieved by form fit.

### Criteria for selection of fits

The following must be taken into consideration in the selection of fits:

- The bearing rings must be well supported on their circumference in order to allow full utilisation of the load carrying capacity of the bearing.
- The bearings must not creep on their mating parts, otherwise the seats will be damaged.
- One ring of the non-locating bearing must adapt to changes in the length of the shaft and housing and must therefore be capable of axial displacement.
- The bearings must be easy to mount and dismount.

Good support of the bearing rings on their circumference requires rigid seating. The requirement that rings must not creep on their mating parts also requires rigid seating. If non-separable bearings must be mounted and dismounted, a tight fit can only be achieved for one bearing ring.

In cylindrical roller bearings N und NU, both rings can have tight fits, since the length compensation takes place within the bearing and since the rings can be mounted separately.



With tight fits and a temperature differential between the inner and outer ring, the radial internal clearance of the bearing is reduced. This must be taken into consideration when selecting the radial internal clearance.

If materials other than cast iron or steel are used for the adjacent construction, the modulus of elasticity and the differing coefficients of thermal expansion of the materials must also be taken into consideration to achieve rigid seating.

For aluminium housings, thin-walled housings and hollow shafts, a closer fit should be selected if necessary in order to achieve the same force locking as with cast iron, steel or solid shafts.

Higher loads, especially shocks, require a fit with larger interference and narrower geometrical tolerances.

### Seats for axial bearings

Axial bearings, which support axial loads only, must not be guided radially – with the exception of axial cylindrical roller bearings which have a degree of freedom in the radial direction due to flat raceways. This is not present in the case of groove-shaped raceways and must be achieved by a loose fit for the stationary washer. A tight fit is normally selected for the rotating washer.

Where axial bearings also support radial forces, such as in axial spherical roller bearings, fits should be selected in the same way as for radial bearings.

The contact surfaces of the mating parts must be perpendicular to the axis of rotation (axial runout tolerance to IT5 or better), in order to ensure uniform load distribution over all the rolling elements.

# Design of bearing arrangements

## Conditions of rotation

The conditions of rotation indicate the motion of one bearing ring with respect to the load direction and are expressed as either circumferential load or point load, see table.

### Point load

If the ring remains stationary relative to the load direction, there are no forces that displace the ring relative to its seating surface. This type of load is described as point load.

There is no risk that the seating surface will be damaged and a loose fit is possible.

### Circumferential load

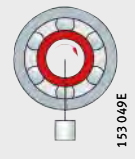
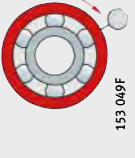
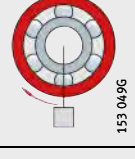

If forces are present that displace the ring relative to its seating surface, every point on the raceway is subjected to load over the course of one revolution of the bearing.

A load with this characteristic is described as a circumferential load.



As damage to the bearing seating surface can occur, a tight fit should be used.

## Conditions of rotation

| Conditions of motion   | Example  | Schematic   | Load case                                 | Fit  |
|--|--|---|---|--|
| Rotating inner ring<br>Stationary outer ring<br>Non-variable load direction            | Shaft with weight load                             |    | Circumferential load on inner ring        | Inner ring: tight fit necessary<br><br>Outer ring: loose fit permissible |
| Stationary inner ring<br>Rotating outer ring<br>Load direction rotates with outer ring | Hub bearing arrangement with significant imbalance |   | and<br>Point load on outer ring           |  |
| Stationary inner ring<br>Rotating outer ring<br>Non-variable load direction            | Back-up roller (hub bearing arrangement)           |  | Point load on inner ring                  | Inner ring: loose fit permissible<br><br>Outer ring: tight fit necessary |
| Rotating inner ring<br>Stationary outer ring<br>Load direction rotates with inner ring | Centrifuge, vibrating screen                       |  | and<br>Circumferential load on outer ring |  |



## Shaft and housing tolerances

The fit is determined by the ISO tolerances for shafts and housings (ISO 286-1:1988) in conjunction with the tolerances  $\Delta_{dmp}$  for the bore and  $\Delta_{Dmp}$  for the outside diameter of the bearings (DIN 620).

## Tolerance zones

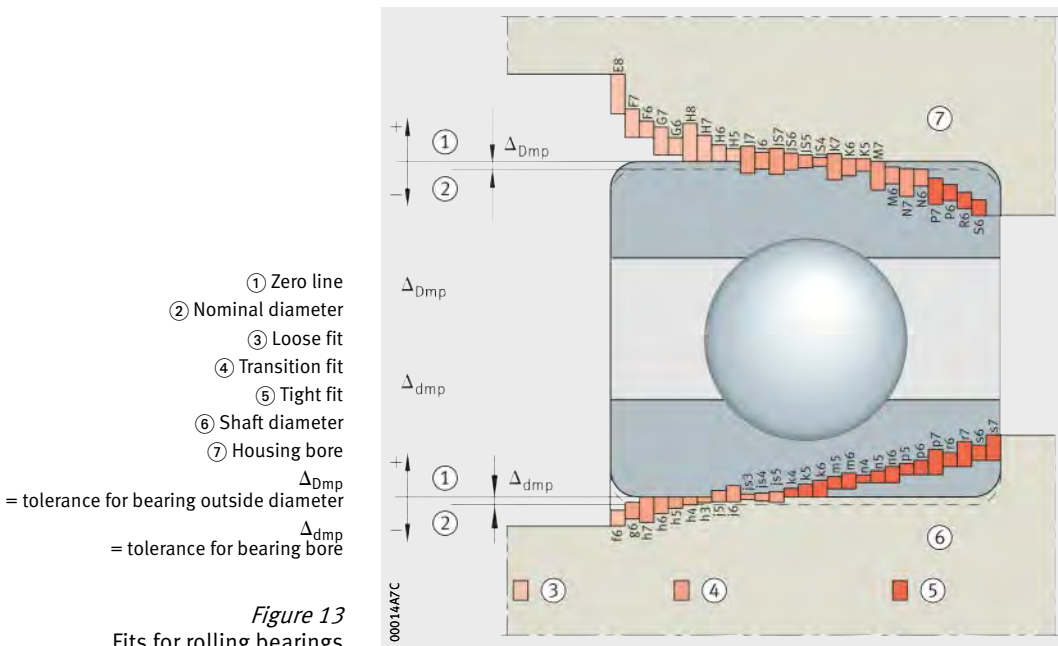
The ISO tolerances are defined in the form of tolerance zones. They are determined by their position relative to the zero line (= tolerance position) and their size (= tolerance grade, see ISO 286-1:1988). The tolerance position is indicated by letters (upper case for housings, lower case for shafts). For a schematic representation of the most common rolling bearing fits, see *Figure 13*.

## Reference to tables of shaft and housing tolerances

The tables on pages 130 and 132 contain recommendations for the selection of shaft and housing tolerances that are valid for normal mounting and operating conditions.

Deviations are possible if particular requirements apply, for example in relation to running accuracy, smooth running or operating temperature. Increased running accuracies thus require closer tolerances such as tolerance grade 5 instead of 6. If the inner ring is warmer than the shaft during operation, the seating may loosen to an impermissible extent. A tighter fit must then be selected, for example m6 instead of k6.

In such cases, the question of fits can only be resolved by a compromise. The individual requirements must be weighed against each other and those fulfilled that give the best overall solution.



*Figure 13*  
Fits for rolling bearings

# Design of bearing arrangements

## Shaft tolerances for radial bearings with cylindrical bore

| Conditions of rotation   | Bearing type                   | Shaft diameter<br>mm | Displacement facility<br>Load  | Tolerance zone |
|--|--------------------------------|----------------------|--|----------------|
| Point load on inner ring   | Ball bearings, roller bearings | All sizes            | Inner ring easily displaced  | g6 (g5)        |
|  |                                |                      | Inner ring not easily displaced<br>Angular contact ball bearings and tapered roller bearings | h6 (j6)        |
| Circumferential load on inner ring or indeterminate load direction | Ball bearings                  | 100 to 200           | Low loads <sup>1)</sup>  | k6 (m6)        |
|  |                                |                      | Normal and high loads <sup>2)</sup>  | m6 (m5)        |
|  |                                | over 200             | Low loads  | m6 (m5)        |
|  |                                |                      | Normal and high loads  | n6 (n5)        |
|  | Roller bearings                | 60 to 200            | Low loads  | k6 (k5)        |
|  |                                |                      | Normal loads   | m6 (m5)        |
|  |                                |                      | High loads   | n6 (n5)        |
|  |                                | 200 to 500           | Normal loads   | m6 (n6)        |
|  |                                |                      | High loads, shocks   | p6             |
|  |                                |                      | over 500   | Normal loads   |
| High loads   | p6                             |                      |  |                |

1)  $C/P > 10$ .

2)  $C/P < 10$ .

## Shaft tolerances for axial bearings

| Load          | Bearing type   | Shaft diameter | Operating conditions                          | Tolerance zone |
|---------------|--|----------------|---|----------------|
| Axial load    | Axial deep groove ball bearings                              | All sizes      | –   | j6             |
|               | Axial cylindrical roller bearings with shaft locating washer |                | –   | h6 (j6)        |
|               | Axial cylindrical roller and cage assembly                   |                | –   | h8             |
| Combined load | Axial spherical roller bearings                              | All sizes      | Point load on shaft locating washer           | j6             |
|               |  | up to 200 mm   | Circumferential load on shaft locating washer | j6 (k6)        |
|               |  | over 200 mm    |   | k6 (m6)        |



## Housing tolerances for radial bearings

| Conditions of rotation   | Displacement facility Load   | Operating conditions   | Tolerance zone        |
|--|--|--|-----------------------|
| Point load on outer ring   | Outer ring easily displaced, housing unsplit   | The tolerance grade is determined by the running accuracy required | H7 (H6) <sup>1)</sup> |
|  | Outer ring easily displaced, housing split   |  | H8 (H7)               |
|  | Outer ring not easily displaced, housing unsplit   | High running accuracy required                                     | H6 (J6)               |
|  | Outer ring not easily displaced, angular contact ball bearings and tapered roller bearings with adjusted outer ring, housing split | Normal running accuracy  | H7 (J7)               |
|  | Outer ring easily displaced  | Heat input via shaft   | G7 <sup>2)</sup>      |
| Circumferential load on outer ring or indeterminate load direction | Low shocks, outer ring cannot be displaced   | High running accuracy required K6, M6, N6 and P6                   | K7 (K6)               |
|  | Normal loads, shocks, outer ring cannot be displaced   |  | M7 (M6)               |
|  | High loads, shocks ( $C/P < 6$ ), outer ring cannot be displaced   |  | N7 (N6)               |
|  | High loads, severe shocks, thin-walled housing, outer ring cannot be displaced   |  | P7 (P6)               |

<sup>1)</sup> G7 for housings made from GG if bearing outside diameter  $D > 250$  mm and temperature differential between outer ring and housing  $> 10$  K.

<sup>2)</sup> F7 for housings made from GG if bearing outside diameter  $D > 250$  mm and temperature differential between outer ring and housing  $> 10$  K.

# Design of bearing arrangements

## Housing tolerances for axial bearings

| Load  | Bearing type   | Operating conditions                             | Tolerance zone |
|---|--|--|----------------|
| Axial load  | Axial deep groove ball bearings                                | Normal running accuracy<br>High running accuracy | E8<br>H6       |
|   | Axial cylindrical roller bearings with housing locating washer | –  | H7 (K7)        |
|   | Axial cylindrical roller and cage assembly                     | –  | H10            |
|   | Axial spherical roller bearings                                | Normal loads<br>High loads                       | E8<br>G7       |
| Combined loads<br>Point load on housing locating washer           | Axial spherical roller bearings                                | –  | H7             |
| Combined loads<br>Circumferential load on housing locating washer | Axial spherical roller bearings                                | –  | K7             |



## Tables of shaft and housing fits

The numerical values for the fits, page 134 to page 145, are valid for solid shafts made from steel and for cast iron housings. In the table header, below the nominal diameters, are the normal tolerances for the bore or outside diameters of radial bearings (excluding tapered roller bearings). Below these are the deviations for the most important tolerance zones for mounting of rolling bearings.

### Shaft fits

In each cell are five numbers in accordance with the following scheme, for example for shaft  $\varnothing 200$  m6.

#### Example: table entry for shaft fit

| Shaft deviation<br>$\mu\text{m}$ |     | Fit interference or fit clearance<br>$\mu\text{m}$ |   |
|----------------------------------|-----|--|---|
| Maximum material value           | +46 | <b>76</b> <sup>2)</sup>                            | Interference or fit clearance if the maximum material values are combined |
|                                  |     | 56 <sup>1)2)</sup>                                 | Probable interference or fit clearance                                    |
| Minimum material value           | +17 | 17 <sup>3)</sup>                                   | Interference or fit clearance if the minimum material values are combined |

- 1) The probable interference or fit clearance is the value obtained if the actual dimensions are one third away from the maximum material values.
- 2) Values printed in bold type indicate fit interference.
- 3) Values printed in regular type indicate fit clearance.

Shaft fits: see page 134 to page 141.

### Housing fits

In each cell are five numbers in accordance with the following scheme, for example for housing  $\varnothing 360$  H6.

#### Example: table entry for housing fit

| Housing deviation<br>$\mu\text{m}$ |     | Fit interference or fit clearance<br>$\mu\text{m}$ |   |
|------------------------------------|-----|--|---|
| Minimum material value             | +36 | <b>0</b> <sup>2)</sup>                             | Interference or fit clearance if the maximum material values are combined |
|                                    |     | 25 <sup>1)2)</sup>                                 | Probable interference or fit clearance                                    |
| Maximum material value             | 0   | 76 <sup>3)</sup>                                   | Interference or fit clearance if the minimum material values are combined |

- 1) The probable interference or fit clearance is the value obtained if the actual dimensions are one third away from the maximum material values.
- 2) Values printed in bold type indicate fit interference.
- 3) Values printed in regular type indicate fit clearance.

Housing fits: see page 142 to page 145.

# Design of bearing arrangements

## Shaft fits

| Nominal shaft diameter in mm   |                          |                              |                          |                              |                          |                              |                          |                              |
|--|--------------------------|------------------------------|--------------------------|------------------------------|--------------------------|------------------------------|--------------------------|------------------------------|
| over<br>incl.  | <b>120</b><br><b>140</b> |                              | <b>140</b><br><b>160</b> |                              | <b>160</b><br><b>180</b> |                              | <b>180</b><br><b>200</b> |                              |
| Deviation of bearing bore diameter in $\mu\text{m}$ (normal tolerance) |                          |                              |                          |                              |                          |                              |                          |                              |
| $\Delta_{\text{dmp}}$  | 0<br>-25                 |                              | 0<br>-25                 |                              | 0<br>-25                 |                              | 0<br>-30                 |                              |
| Shaft deviation, fit interference or fit clearance in $\mu\text{m}$    |                          |                              |                          |                              |                          |                              |                          |                              |
| <b>g5</b>  | -14<br>-32               | <b>11</b><br>3<br>32         | -14<br>-32               | <b>11</b><br>3<br>32         | -14<br>-32               | <b>11</b><br>3<br>32         | -15<br>-35               | <b>15</b><br>2<br>35         |
| <b>g6</b>  | -14<br>-39               | <b>11</b><br>6<br>39         | -14<br>-39               | <b>11</b><br>6<br>39         | -14<br>-39               | <b>11</b><br>6<br>39         | -15<br>-44               | <b>15</b><br>5<br>44         |
| <b>h5</b>  | 0<br>-18                 | <b>25</b><br><b>11</b><br>18 | 0<br>-18                 | <b>25</b><br><b>11</b><br>18 | 0<br>-18                 | <b>25</b><br><b>11</b><br>18 | 0<br>-20                 | <b>30</b><br><b>13</b><br>20 |
| <b>h6</b>  | 0<br>-25                 | <b>25</b><br><b>8</b><br>25  | 0<br>-25                 | <b>25</b><br><b>8</b><br>25  | 0<br>-25                 | <b>25</b><br><b>8</b><br>25  | 0<br>-29                 | <b>30</b><br><b>10</b><br>29 |
| <b>j5</b>  | +7<br>-11                | <b>32</b><br><b>18</b><br>11 | +7<br>-11                | <b>32</b><br><b>18</b><br>11 | +7<br>-11                | <b>32</b><br><b>18</b><br>11 | +7<br>-13                | <b>37</b><br><b>20</b><br>13 |
| <b>j6</b>  | +14<br>-11               | <b>39</b><br><b>22</b><br>11 | +14<br>-11               | <b>39</b><br><b>22</b><br>11 | +14<br>-11               | <b>39</b><br><b>22</b><br>11 | +16<br>-13               | <b>46</b><br><b>26</b><br>13 |
| <b>js5</b>   | +9<br>-9                 | <b>34</b><br><b>20</b><br>9  | +9<br>-9                 | <b>34</b><br><b>20</b><br>9  | +9<br>-9                 | <b>34</b><br><b>20</b><br>9  | +10<br>-10               | <b>40</b><br><b>23</b><br>10 |
| <b>js6</b>   | +12,5<br>-12,5           | <b>38</b><br><b>21</b><br>13 | +12,5<br>-12,5           | <b>38</b><br><b>21</b><br>13 | +12,5<br>-12,5           | <b>38</b><br><b>21</b><br>13 | +14,5<br>-14,5           | <b>45</b><br><b>25</b><br>15 |
| <b>k5</b>  | +21<br>+3                | <b>46</b><br><b>32</b><br>3  | +21<br>+3                | <b>46</b><br><b>32</b><br>3  | +21<br>+3                | <b>46</b><br><b>32</b><br>3  | +24<br>+4                | <b>54</b><br><b>37</b><br>4  |
| <b>k6</b>  | +28<br>+3                | <b>53</b><br><b>36</b><br>3  | +28<br>+3                | <b>53</b><br><b>36</b><br>3  | +28<br>+3                | <b>53</b><br><b>36</b><br>3  | +33<br>+4                | <b>63</b><br><b>43</b><br>4  |
| <b>m5</b>  | +33<br>+15               | <b>58</b><br><b>44</b><br>15 | +33<br>+15               | <b>58</b><br><b>44</b><br>15 | +33<br>+15               | <b>58</b><br><b>44</b><br>15 | +37<br>+17               | <b>67</b><br><b>50</b><br>17 |
| <b>m6</b>  | +40<br>+15               | <b>65</b><br><b>48</b><br>15 | +40<br>+15               | <b>65</b><br><b>48</b><br>15 | +40<br>+15               | <b>65</b><br><b>48</b><br>15 | +46<br>+17               | <b>76</b><br><b>56</b><br>17 |





| 200<br>225     |                       | 225<br>250     |                       | 250<br>280     |                       | 280<br>315     |                       | 315<br>355     |                       | 355<br>400     |                       | 400<br>450     |                        | 450<br>500     |                        |
|----------------|-----------------------|----------------|-----------------------|----------------|-----------------------|----------------|-----------------------|----------------|-----------------------|----------------|-----------------------|----------------|------------------------|----------------|------------------------|
| 0<br>-30       |                       | 0<br>-30       |                       | 0<br>-35       |                       | 0<br>-35       |                       | 0<br>-40       |                       | 0<br>-40       |                       | 0<br>-45       |                        | 0<br>-45       |                        |
| -15<br>-35     | <b>15</b><br>2<br>35  | -15<br>-35     | <b>15</b><br>2<br>35  | -17<br>-40     | <b>18</b><br>1<br>40  | -17<br>-40     | <b>18</b><br>1<br>40  | -18<br>-43     | <b>22</b><br>0<br>43  | -18<br>-43     | <b>22</b><br>0<br>43  | -20<br>-47     | <b>25</b><br>1<br>47   | -20<br>-47     | <b>25</b><br>1<br>47   |
| -15<br>-44     | <b>15</b><br>5<br>44  | -15<br>-44     | <b>15</b><br>5<br>44  | -17<br>-49     | <b>18</b><br>4<br>49  | -17<br>-49     | <b>18</b><br>4<br>49  | -18<br>-54     | <b>22</b><br>3<br>54  | -18<br>-54     | <b>22</b><br>3<br>54  | -20<br>-60     | <b>25</b><br>3<br>60   | -20<br>-60     | <b>25</b><br>3<br>60   |
| 0<br>-20       | <b>30</b><br>13<br>20 | 0<br>-20       | <b>30</b><br>13<br>20 | 0<br>-23       | <b>35</b><br>16<br>23 | 0<br>-23       | <b>35</b><br>16<br>23 | 0<br>-25       | <b>40</b><br>18<br>25 | 0<br>-25       | <b>40</b><br>18<br>25 | 0<br>-27       | <b>45</b><br>21<br>27  | 0<br>-27       | <b>45</b><br>21<br>27  |
| 0<br>-29       | <b>30</b><br>10<br>29 | 0<br>-29       | <b>30</b><br>10<br>29 | 0<br>-32       | <b>35</b><br>13<br>32 | 0<br>-32       | <b>35</b><br>13<br>32 | 0<br>-36       | <b>40</b><br>15<br>36 | 0<br>-36       | <b>40</b><br>15<br>36 | 0<br>-40       | <b>45</b><br>17<br>40  | 0<br>-40       | <b>45</b><br>17<br>40  |
| +7<br>-13      | <b>37</b><br>20<br>13 | +7<br>-13      | <b>37</b><br>20<br>13 | +7<br>-16      | <b>42</b><br>23<br>16 | +7<br>-16      | <b>42</b><br>23<br>16 | +7<br>-18      | <b>47</b><br>25<br>18 | +7<br>-18      | <b>47</b><br>25<br>18 | +7<br>-20      | <b>52</b><br>28<br>20  | +7<br>-20      | <b>52</b><br>28<br>20  |
| +16<br>-13     | <b>46</b><br>26<br>13 | +16<br>-13     | <b>46</b><br>26<br>13 | +16<br>-16     | <b>51</b><br>29<br>16 | +16<br>-16     | <b>51</b><br>29<br>16 | +18<br>-18     | <b>58</b><br>33<br>18 | +18<br>-18     | <b>58</b><br>33<br>18 | +20<br>-20     | <b>65</b><br>37<br>20  | +20<br>-20     | <b>65</b><br>37<br>20  |
| +10<br>-10     | <b>40</b><br>23<br>10 | +10<br>-10     | <b>40</b><br>23<br>10 | +11,5<br>-11,5 | <b>47</b><br>27<br>12 | +11,5<br>-11,5 | <b>47</b><br>27<br>12 | +12,5<br>-12,5 | <b>53</b><br>32<br>13 | +12,5<br>-12,5 | <b>53</b><br>32<br>13 | +13,5<br>-13,5 | <b>59</b><br>35<br>14  | +13,5<br>-13,5 | <b>59</b><br>35<br>14  |
| +14,5<br>-14,5 | <b>45</b><br>25<br>15 | +14,5<br>-14,5 | <b>45</b><br>25<br>15 | +16<br>-16     | <b>51</b><br>29<br>16 | +16<br>-16     | <b>51</b><br>29<br>16 | +18<br>-18     | <b>58</b><br>33<br>18 | +18<br>-18     | <b>58</b><br>33<br>18 | +20<br>-20     | <b>65</b><br>37<br>20  | +20<br>-20     | <b>65</b><br>37<br>20  |
| +24<br>+4      | <b>54</b><br>37<br>4  | +24<br>+4      | <b>54</b><br>37<br>4  | +27<br>+4      | <b>62</b><br>43<br>4  | +27<br>+4      | <b>62</b><br>43<br>4  | +29<br>+4      | <b>69</b><br>47<br>4  | +29<br>+4      | <b>69</b><br>47<br>4  | +32<br>+5      | <b>77</b><br>53<br>5   | +32<br>+5      | <b>77</b><br>53<br>5   |
| +33<br>+4      | <b>63</b><br>43<br>4  | +33<br>+4      | <b>63</b><br>43<br>4  | +36<br>+4      | <b>71</b><br>49<br>4  | +36<br>+4      | <b>71</b><br>49<br>4  | +40<br>+4      | <b>80</b><br>55<br>4  | +40<br>+4      | <b>80</b><br>55<br>4  | +45<br>+5      | <b>90</b><br>62<br>5   | +45<br>+5      | <b>90</b><br>62<br>5   |
| +37<br>+17     | <b>67</b><br>50<br>17 | +37<br>+17     | <b>67</b><br>50<br>17 | +43<br>+20     | <b>78</b><br>59<br>20 | +43<br>+20     | <b>78</b><br>59<br>20 | +46<br>+21     | <b>86</b><br>64<br>21 | +46<br>+21     | <b>86</b><br>64<br>21 | +50<br>+23     | <b>95</b><br>71<br>23  | +50<br>+23     | <b>95</b><br>71<br>23  |
| +46<br>+17     | <b>76</b><br>56<br>17 | +46<br>+17     | <b>76</b><br>56<br>17 | +52<br>+20     | <b>87</b><br>65<br>20 | +52<br>+20     | <b>87</b><br>65<br>20 | +57<br>+21     | <b>97</b><br>72<br>21 | +57<br>+21     | <b>97</b><br>72<br>21 | +63<br>+23     | <b>108</b><br>80<br>23 | +63<br>+23     | <b>108</b><br>80<br>23 |

# Design of bearing arrangements

Shaft fits  
continued

| Nominal shaft diameter in mm   |                    |                                      |                    |                                      |                    |                                       |                    |                                       |
|--|--------------------|--------------------------------------|--------------------|--------------------------------------|--------------------|---------------------------------------|--------------------|---------------------------------------|
| over<br>incl.  | <b>500<br/>560</b> |                                      | <b>560<br/>630</b> |                                      | <b>630<br/>710</b> |                                       | <b>710<br/>800</b> |                                       |
| Deviation of bearing bore diameter in $\mu\text{m}$ (normal tolerance) |                    |                                      |                    |                                      |                    |                                       |                    |                                       |
| $\Delta_{\text{dmp}}$  | 0<br>-50           |                                      | 0<br>-50           |                                      | 0<br>-75           |                                       | 0<br>-75           |                                       |
| Shaft deviation, fit interference or fit clearance in $\mu\text{m}$    |                    |                                      |                    |                                      |                    |                                       |                    |                                       |
| <b>g5</b>  | -22<br>-51         | <b>28</b><br><b>1</b><br>51          | -22<br>-51         | <b>28</b><br><b>1</b><br>51          | -24<br>-56         | <b>51</b><br><b>15</b><br>56          | -24<br>-56         | <b>51</b><br><b>15</b><br>56          |
| <b>g6</b>  | -22<br>-66         | <b>28</b><br>4<br>66                 | -22<br>-66         | <b>28</b><br>4<br>66                 | -24<br>-74         | <b>51</b><br><b>9</b><br>74           | -24<br>-74         | <b>51</b><br><b>9</b><br>74           |
| <b>h5</b>  | 0<br>-29           | <b>50</b><br><b>23</b><br>29         | 0<br>-29           | <b>50</b><br><b>23</b><br>29         | 0<br>-32           | <b>75</b><br><b>39</b><br>32          | 0<br>-32           | <b>75</b><br><b>39</b><br>32          |
| <b>h6</b>  | 0<br>-44           | <b>50</b><br><b>18</b><br>44         | 0<br>-44           | <b>50</b><br><b>18</b><br>44         | 0<br>-50           | <b>75</b><br><b>33</b><br>50          | 0<br>-50           | <b>75</b><br><b>33</b><br>50          |
| <b>j5</b>  | -                  | -                                    | -                  | -                                    | -                  | -                                     | -                  | -                                     |
| <b>j6</b>  | +22<br>-22         | <b>72</b><br><b>40</b><br>22         | +22<br>-22         | <b>72</b><br><b>40</b><br>22         | +25<br>-25         | <b>100</b><br><b>58</b><br>25         | +25<br>-25         | <b>100</b><br><b>58</b><br>25         |
| <b>js5</b>   | +14,5<br>-14,5     | <b>65</b><br><b>38</b><br>15         | +14,5<br>-14,5     | <b>65</b><br><b>38</b><br>15         | +16<br>-16         | <b>91</b><br><b>55</b><br>16          | +16<br>-16         | <b>91</b><br><b>55</b><br>16          |
| <b>js6</b>   | +22<br>-22         | <b>72</b><br><b>40</b><br>22         | +22<br>-22         | <b>72</b><br><b>40</b><br>22         | +25<br>-25         | <b>100</b><br><b>58</b><br>25         | +25<br>-25         | <b>100</b><br><b>58</b><br>25         |
| <b>k5</b>  | +29<br>0           | <b>79</b><br><b>53</b><br><b>0</b>   | +29<br>0           | <b>79</b><br><b>53</b><br><b>0</b>   | +32<br>0           | <b>107</b><br><b>71</b><br><b>0</b>   | +32<br>0           | <b>107</b><br><b>71</b><br><b>0</b>   |
| <b>k6</b>  | +44<br>0           | <b>94</b><br><b>62</b><br><b>0</b>   | +44<br>0           | <b>94</b><br><b>62</b><br><b>0</b>   | +50<br>0           | <b>125</b><br><b>83</b><br><b>0</b>   | +50<br>0           | <b>125</b><br><b>83</b><br><b>0</b>   |
| <b>m5</b>  | +55<br>+26         | <b>105</b><br><b>78</b><br><b>26</b> | +55<br>+26         | <b>105</b><br><b>78</b><br><b>26</b> | +62<br>+30         | <b>137</b><br><b>101</b><br><b>30</b> | +62<br>+30         | <b>137</b><br><b>101</b><br><b>30</b> |
| <b>m6</b>  | +70<br>+26         | <b>120</b><br><b>88</b><br><b>26</b> | +70<br>+26         | <b>120</b><br><b>88</b><br><b>26</b> | +80<br>+30         | <b>155</b><br><b>113</b><br><b>30</b> | +80<br>+30         | <b>155</b><br><b>113</b><br><b>30</b> |



| <b>800<br/>900</b> |                                       | <b>900<br/>1000</b> |                                       | <b>1000<br/>1120</b> |                                       | <b>1120<br/>1250</b> |                                       | <b>1250<br/>1600</b> |                                       | <b>1600<br/>2000</b> |                                       | <b>2000<br/>2500</b> |                                       |
|--------------------|---------------------------------------|---------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|---------------------------------------|
| 0<br>-100          |                                       | 0<br>-100           |                                       | 0<br>-125            |                                       | 0<br>-125            |                                       | 0<br>-160            |                                       | 0<br>-200            |                                       | 0<br>-250            |                                       |
| -26<br>-62         | <b>74</b><br><b>29</b><br>62          | -26<br>-62          | <b>74</b><br><b>29</b><br>62          | -28<br>-70           | <b>97</b><br><b>41</b><br>70          | -28<br>-70           | <b>97</b><br><b>41</b><br>70          | -30<br>-80           | <b>130</b><br><b>60</b><br>80         | -32<br>-92           | <b>168</b><br><b>81</b><br>92         | -34<br>-104          | <b>216</b><br><b>109</b><br>104       |
| -26<br>-82         | <b>74</b><br><b>24</b><br>82          | -26<br>-82          | <b>74</b><br><b>24</b><br>82          | -28<br>-94           | <b>97</b><br><b>33</b><br>94          | -28<br>-94           | <b>97</b><br><b>33</b><br>94          | -30<br>-108          | <b>130</b><br><b>41</b><br>108        | -32<br>-124          | <b>168</b><br><b>71</b><br>124        | -34<br>-144          | <b>216</b><br><b>96</b><br>144        |
| 0<br>-36           | <b>100</b><br><b>55</b><br>36         | 0<br>-36            | <b>100</b><br><b>55</b><br>36         | 0<br>-42             | <b>125</b><br><b>69</b><br>42         | 0<br>-42             | <b>125</b><br><b>69</b><br>42         | 0<br>-50             | <b>160</b><br><b>90</b><br>50         | 0<br>-60             | <b>200</b><br><b>119</b><br>60        | 0<br>-70             | <b>250</b><br><b>143</b><br>70        |
| 0<br>-56           | <b>100</b><br><b>48</b><br>56         | 0<br>-56            | <b>100</b><br><b>48</b><br>56         | 0<br>-66             | <b>125</b><br><b>61</b><br>66         | 0<br>-66             | <b>125</b><br><b>61</b><br>66         | 0<br>-78             | <b>160</b><br><b>81</b><br>78         | 0<br>-92             | <b>200</b><br><b>103</b><br>92        | 0<br>-110            | <b>250</b><br><b>130</b><br>110       |
| -                  | -                                     | -                   | -                                     | -                    | -                                     | -                    | -                                     | -                    | -                                     | -                    | -                                     | -                    | -                                     |
| +28<br>-28         | <b>128</b><br><b>76</b><br>28         | +28<br>-28          | <b>128</b><br><b>76</b><br>28         | +33<br>-33           | <b>158</b><br><b>94</b><br>33         | +33<br>-33           | <b>158</b><br><b>94</b><br>33         | +39<br>-39           | <b>199</b><br><b>120</b><br>39        | +46<br>-46           | <b>246</b><br><b>149</b><br>46        | +55<br>-55           | <b>305</b><br><b>185</b><br>55        |
| +18<br>-18         | <b>118</b><br><b>73</b><br>18         | +18<br>-18          | <b>118</b><br><b>73</b><br>18         | +21<br>-21           | <b>146</b><br><b>90</b><br>21         | +21<br>-21           | <b>146</b><br><b>90</b><br>21         | +25<br>-25           | <b>185</b><br><b>115</b><br>25        | +30<br>-30           | <b>230</b><br><b>143</b><br>30        | +35<br>-35           | <b>285</b><br><b>178</b><br>35        |
| +28<br>-28         | <b>128</b><br><b>76</b><br>28         | +28<br>-28          | <b>128</b><br><b>76</b><br>28         | +33<br>-33           | <b>158</b><br><b>94</b><br>33         | +33<br>-33           | <b>158</b><br><b>94</b><br>33         | +39<br>-39           | <b>199</b><br><b>120</b><br>39        | +46<br>-46           | <b>246</b><br><b>149</b><br>46        | +55<br>-55           | <b>305</b><br><b>185</b><br>55        |
| +36<br>0           | <b>136</b><br><b>91</b><br>0          | +36<br>0            | <b>136</b><br><b>91</b><br>0          | +42<br>0             | <b>167</b><br><b>111</b><br>0         | +42<br>0             | <b>167</b><br><b>111</b><br>0         | +50<br>0             | <b>210</b><br><b>140</b><br>0         | +60<br>0             | <b>260</b><br><b>173</b><br>0         | +70<br>0             | <b>320</b><br><b>213</b><br>0         |
| +56<br>0           | <b>156</b><br><b>104</b><br>0         | +56<br>0            | <b>156</b><br><b>104</b><br>0         | +66<br>0             | <b>191</b><br><b>127</b><br>0         | +66<br>0             | <b>191</b><br><b>127</b><br>0         | +78<br>0             | <b>238</b><br><b>159</b><br>0         | +92<br>0             | <b>292</b><br><b>195</b><br>0         | +110<br>0            | <b>360</b><br><b>240</b><br>0         |
| +70<br>+34         | <b>170</b><br><b>125</b><br><b>34</b> | +70<br>+34          | <b>170</b><br><b>125</b><br><b>34</b> | +82<br>+40           | <b>207</b><br><b>151</b><br><b>40</b> | +82<br>+40           | <b>207</b><br><b>151</b><br><b>40</b> | +98<br>+48           | <b>258</b><br><b>188</b><br><b>48</b> | +118<br>+58          | <b>318</b><br><b>193</b><br><b>58</b> | +138<br>+68          | <b>388</b><br><b>236</b><br><b>68</b> |
| +90<br>+34         | <b>190</b><br><b>138</b><br><b>34</b> | +90<br>+34          | <b>190</b><br><b>138</b><br><b>34</b> | +106<br>+40          | <b>231</b><br><b>167</b><br><b>40</b> | +106<br>+40          | <b>231</b><br><b>167</b><br><b>40</b> | +126<br>+48          | <b>286</b><br><b>207</b><br><b>48</b> | +150<br>+58          | <b>350</b><br><b>214</b><br><b>58</b> | +178<br>+68          | <b>428</b><br><b>263</b><br><b>68</b> |

# Design of bearing arrangements

## Shaft fits

| Nominal shaft diameter in mm   |            |             |            |             |            |             |            |             |
|--|------------|-------------|------------|-------------|------------|-------------|------------|-------------|
| over   | <b>120</b> |             | <b>140</b> |             | <b>160</b> |             | <b>180</b> |             |
| incl.  | <b>140</b> |             | <b>160</b> |             | <b>180</b> |             | <b>200</b> |             |
| Deviation of bearing bore diameter in $\mu\text{m}$ (normal tolerance) |            |             |            |             |            |             |            |             |
| $\Delta_{\text{dmp}}$  | 0          |             | 0          |             | 0          |             | 0          |             |
|  | -25        |             | -25        |             | -25        |             | -30        |             |
| Shaft deviation, fit interference or fit clearance in $\mu\text{m}$    |            |             |            |             |            |             |            |             |
| <b>n5</b>  | +45        | <b>70</b>   | +45        | <b>70</b>   | +45        | <b>70</b>   | +51        | <b>81</b>   |
|  | +27        | <b>56</b>   | +27        | <b>56</b>   | +27        | <b>56</b>   | +31        | <b>64</b>   |
| <b>n6</b>  | +52        | <b>77</b>   | +52        | <b>77</b>   | +52        | <b>77</b>   | +60        | <b>90</b>   |
|  | +27        | <b>60</b>   | +27        | <b>60</b>   | +27        | <b>60</b>   | +31        | <b>70</b>   |
| <b>p6</b>  | +68        | <b>93</b>   | +68        | <b>93</b>   | +68        | <b>93</b>   | +79        | <b>109</b>  |
|  | +43        | <b>76</b>   | +43        | <b>76</b>   | +43        | <b>76</b>   | +50        | <b>89</b>   |
| <b>p7</b>  | +83        | <b>108</b>  | +83        | <b>108</b>  | +83        | <b>108</b>  | +96        | <b>126</b>  |
|  | +43        | <b>87</b>   | +43        | <b>87</b>   | +43        | <b>87</b>   | +50        | <b>101</b>  |
| <b>r6</b>  | +88        | <b>113</b>  | +90        | <b>115</b>  | +93        | <b>118</b>  | +106       | <b>136</b>  |
|  | +63        | <b>97</b>   | +65        | <b>99</b>   | +68        | <b>102</b>  | +77        | <b>116</b>  |
| <b>r7</b>  | +103       | <b>128</b>  | +105       | <b>130</b>  | +108       | <b>133</b>  | +123       | <b>153</b>  |
|  | +63        | <b>107</b>  | +65        | <b>109</b>  | +68        | <b>112</b>  | +77        | <b>128</b>  |
|  |            | <b>63</b>   |            | <b>65</b>   |            | <b>68</b>   |            | <b>77</b>   |
| Shaft tolerances for adapter sleeves and withdrawal sleeves            |            |             |            |             |            |             |            |             |
| <b>h7</b> / $\frac{\text{IT5}}{2}$                                     | 0          | <i>9</i>    | 0          | <i>9</i>    | 0          | <i>9</i>    | 0          | <i>10</i>   |
|  | -40        |             | -40        |             | -40        |             | -46        |             |
| <b>h8</b> / $\frac{\text{IT5}}{2}$                                     | 0          | <i>9</i>    | 0          | <i>9</i>    | 0          | <i>9</i>    | 0          | <i>10</i>   |
|  | -63        |             | -63        |             | -63        |             | -72        |             |
| <b>h9</b> / $\frac{\text{IT6}}{2}$                                     | 0          | <i>12,5</i> | 0          | <i>12,5</i> | 0          | <i>12,5</i> | 0          | <i>14,5</i> |
|  | -100       |             | -100       |             | -100       |             | -115       |             |

The values printed in *italic* indicate guide values for the cylindricity tolerance  $t_1$  (DIN ISO 1101).



| 200<br>225  |                                       | 225<br>250  |                                       | 250<br>280  |                                       | 280<br>315  |                                       | 315<br>355   |  | 355<br>400   |  | 400<br>450   |  |
|-------------|---------------------------------------|-------------|---------------------------------------|-------------|---------------------------------------|-------------|---------------------------------------|--------------|--|--------------|--|--------------|--|
| 0<br>-30    |                                       | 0<br>-30    |                                       | 0<br>-35    |                                       | 0<br>-35    |                                       | 0<br>-40     |  | 0<br>-40     |  | 0<br>-45     |  |
| +51<br>+31  | <b>81</b><br><b>64</b><br><b>31</b>   | +51<br>+31  | <b>81</b><br><b>64</b><br><b>31</b>   | +57<br>+34  | <b>92</b><br><b>73</b><br><b>34</b>   | +57<br>+34  | <b>92</b><br><b>73</b><br><b>34</b>   | +62<br>+37   | <b>102</b><br><b>80</b><br><b>37</b>   | +62<br>+37   | <b>102</b><br><b>80</b><br><b>37</b>   | +67<br>+40   | <b>112</b><br><b>88</b><br><b>40</b>   |
| +60<br>+31  | <b>90</b><br><b>70</b><br><b>31</b>   | +60<br>+31  | <b>90</b><br><b>70</b><br><b>31</b>   | +66<br>+34  | <b>101</b><br><b>79</b><br><b>34</b>  | +66<br>+34  | <b>101</b><br><b>79</b><br><b>34</b>  | +73<br>+37   | <b>113</b><br><b>88</b><br><b>37</b>   | +73<br>+37   | <b>113</b><br><b>88</b><br><b>37</b>   | +80<br>+40   | <b>125</b><br><b>97</b><br><b>40</b>   |
| +79<br>+50  | <b>109</b><br><b>89</b><br><b>50</b>  | +79<br>+50  | <b>109</b><br><b>89</b><br><b>50</b>  | +88<br>+56  | <b>123</b><br><b>101</b><br><b>56</b> | +88<br>+56  | <b>123</b><br><b>101</b><br><b>56</b> | +98<br>+62   | <b>138</b><br><b>113</b><br><b>62</b>  | +98<br>+62   | <b>138</b><br><b>113</b><br><b>62</b>  | +108<br>+68  | <b>153</b><br><b>125</b><br><b>68</b>  |
| +96<br>+50  | <b>126</b><br><b>101</b><br><b>50</b> | +96<br>+50  | <b>126</b><br><b>101</b><br><b>50</b> | +108<br>+56 | <b>143</b><br><b>114</b><br><b>56</b> | +108<br>+56 | <b>143</b><br><b>114</b><br><b>56</b> | +119<br>+62  | <b>159</b><br><b>127</b><br><b>62</b>  | +119<br>+62  | <b>159</b><br><b>127</b><br><b>62</b>  | +131<br>+68  | <b>176</b><br><b>139</b><br><b>68</b>  |
| +109<br>+80 | <b>139</b><br><b>119</b><br><b>80</b> | +113<br>+84 | <b>143</b><br><b>123</b><br><b>84</b> | +126<br>+94 | <b>161</b><br><b>138</b><br><b>94</b> | +130<br>+98 | <b>165</b><br><b>142</b><br><b>98</b> | +144<br>+108 | <b>184</b><br><b>159</b><br><b>108</b> | +150<br>+114 | <b>190</b><br><b>165</b><br><b>114</b> | +166<br>+126 | <b>211</b><br><b>183</b><br><b>126</b> |
| +126<br>+80 | <b>156</b><br><b>131</b><br><b>80</b> | +130<br>+84 | <b>160</b><br><b>135</b><br><b>84</b> | +146<br>+94 | <b>181</b><br><b>152</b><br><b>94</b> | +150<br>+98 | <b>185</b><br><b>156</b><br><b>98</b> | +165<br>+108 | <b>205</b><br><b>173</b><br><b>108</b> | +171<br>+114 | <b>211</b><br><b>179</b><br><b>114</b> | +189<br>+126 | <b>234</b><br><b>198</b><br><b>126</b> |
| 0<br>-46    | <i>10</i>                             | 0<br>-46    | <i>10</i>                             | 0<br>-52    | <i>11,5</i>                           | 0<br>-52    | <i>11,5</i>                           | 0<br>-57     | <i>12,5</i>                            | 0<br>-57     | <i>12,5</i>                            | 0<br>-63     | <i>13,5</i>                            |
| 0<br>-72    | <i>10</i>                             | 0<br>-72    | <i>10</i>                             | 0<br>-81    | <i>11,5</i>                           | 0<br>-81    | <i>11,5</i>                           | 0<br>-89     | <i>12,5</i>                            | 0<br>-89     | <i>12,5</i>                            | 0<br>-97     | <i>13,5</i>                            |
| 0<br>-115   | <i>14,5</i>                           | 0<br>-115   | <i>14,5</i>                           | 0<br>-130   | <i>16</i>                             | 0<br>-130   | <i>16</i>                             | 0<br>-140    | <i>18</i>                              | 0<br>-140    | <i>18</i>                              | 0<br>-155    | <i>20</i>                              |

# Design of bearing arrangements

Shaft fits  
continued

| Nominal shaft diameter in mm   |            |             |            |             |            |             |            |            |
|--|------------|-------------|------------|-------------|------------|-------------|------------|------------|
| over<br>incl.  | 450<br>500 |             | 500<br>560 |             | 560<br>630 |             | 630<br>710 |            |
| Deviation of bearing bore diameter in $\mu\text{m}$ (normal tolerance) |            |             |            |             |            |             |            |            |
| $\Delta_{\text{dmp}}$  | 0<br>-45   |             | 0<br>-50   |             | 0<br>-50   |             | 0<br>-75   |            |
| Shaft deviation, fit interference or fit clearance in $\mu\text{m}$    |            |             |            |             |            |             |            |            |
| <b>n5</b>  | +67        | <b>112</b>  | +73        | <b>123</b>  | +73        | <b>123</b>  | +82        | <b>157</b> |
|  | +40        | <b>88</b>   | +44        | <b>96</b>   | +44        | <b>96</b>   | +50        | <b>121</b> |
|  |            | <b>40</b>   |            | <b>44</b>   |            | <b>44</b>   |            | <b>50</b>  |
| <b>n6</b>  | +80        | <b>125</b>  | +88        | <b>138</b>  | +88        | <b>138</b>  | +100       | <b>175</b> |
|  | +40        | <b>97</b>   | +44        | <b>106</b>  | +44        | <b>106</b>  | +50        | <b>133</b> |
|  |            | <b>40</b>   |            | <b>44</b>   |            | <b>44</b>   |            | <b>50</b>  |
| <b>p6</b>  | +108       | <b>153</b>  | +122       | <b>172</b>  | +122       | <b>172</b>  | +138       | <b>213</b> |
|  | +68        | <b>125</b>  | +78        | <b>140</b>  | +78        | <b>140</b>  | +88        | <b>171</b> |
|  |            | <b>68</b>   |            | <b>78</b>   |            | <b>78</b>   |            | <b>88</b>  |
| <b>p7</b>  | +131       | <b>176</b>  | +148       | <b>198</b>  | +148       | <b>198</b>  | +168       | <b>243</b> |
|  | +68        | <b>139</b>  | +78        | <b>158</b>  | +78        | <b>158</b>  | +88        | <b>199</b> |
|  |            | <b>68</b>   |            | <b>78</b>   |            | <b>78</b>   |            | <b>88</b>  |
| <b>r6</b>  | +172       | <b>217</b>  | +194       | <b>244</b>  | +199       | <b>249</b>  | +225       | <b>300</b> |
|  | +132       | <b>189</b>  | +150       | <b>212</b>  | +155       | <b>217</b>  | +175       | <b>258</b> |
|  |            | <b>132</b>  |            | <b>150</b>  |            | <b>155</b>  |            | <b>175</b> |
| <b>r7</b>  | +195       | <b>240</b>  | +220       | <b>270</b>  | +225       | <b>275</b>  | +255       | <b>330</b> |
|  | +132       | <b>204</b>  | +150       | <b>230</b>  | +155       | <b>235</b>  | +175       | <b>278</b> |
|  |            | <b>132</b>  |            | <b>150</b>  |            | <b>155</b>  |            | <b>175</b> |
| Shaft tolerances for adapter sleeves and withdrawal sleeves            |            |             |            |             |            |             |            |            |
| <b>h7</b> / $\frac{\text{IT5}}{2}$                                     | 0<br>-63   | <i>13,5</i> | 0<br>-70   | <i>14,5</i> | 0<br>-70   | <i>14,5</i> | 0<br>-80   | <i>16</i>  |
| <b>h8</b> / $\frac{\text{IT5}}{2}$                                     | 0<br>-97   | <i>13,5</i> | 0<br>-110  | <i>14,5</i> | 0<br>-110  | <i>14,5</i> | 0<br>-125  | <i>16</i>  |
| <b>h9</b> / $\frac{\text{IT6}}{2}$                                     | 0<br>-155  | <i>20</i>   | 0<br>-175  | <i>22</i>   | 0<br>-175  | <i>22</i>   | 0<br>-200  | <i>25</i>  |

The values printed in *italic* indicate guide values for the cylindricity tolerance  $t_1$  (DIN ISO 1101).



| 710  |     | 800  |     | 900  |     | 1000 |     | 1120 |     | 1250 |     | 1600 |     | 2000 |     |
|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| 800  |     | 900  |     | 1000 |     | 1120 |     | 1250 |     | 1600 |     | 2000 |     | 2500 |     |
| 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     |
| -75  |     | -100 |     | -100 |     | -125 |     | -125 |     | -160 |     | -200 |     | -250 |     |
| +82  | 157 | +92  | 192 | +92  | 192 | +108 | 233 | +108 | 233 | +128 | 288 | +152 | 352 | +180 | 430 |
| +50  | 121 | +56  | 147 | +56  | 147 | +66  | 177 | +66  | 177 | +78  | 218 | +92  | 204 | +110 | 283 |
|      | 50  |      | 56  |      | 56  |      | 66  |      | 66  |      | 78  |      | 92  |      | 110 |
| +100 | 175 | +112 | 212 | +112 | 212 | +132 | 257 | +132 | 257 | +156 | 316 | +184 | 384 | +220 | 470 |
| +50  | 133 | +56  | 160 | +56  | 160 | +66  | 193 | +66  | 193 | +78  | 237 | +92  | 225 | +110 | 277 |
|      | 50  |      | 56  |      | 56  |      | 66  |      | 66  |      | 78  |      | 92  |      | 110 |
| +138 | 213 | +156 | 256 | +156 | 256 | +186 | 311 | +186 | 311 | +218 | 378 | +262 | 462 | +305 | 555 |
| +88  | 171 | +100 | 204 | +100 | 204 | +120 | 247 | +120 | 247 | +140 | 299 | +170 | 251 | +195 | 305 |
|      | 88  |      | 100 |      | 100 |      | 120 |      | 120 |      | 140 |      | 170 |      | 195 |
| +168 | 243 | +190 | 290 | +190 | 290 | +225 | 350 | +225 | 350 | +265 | 425 | +320 | 520 | +370 | 620 |
| +88  | 199 | +100 | 227 | +100 | 227 | +120 | 273 | +120 | 273 | +140 | 330 | +170 | 290 | +195 | 348 |
|      | 88  |      | 100 |      | 100 |      | 120 |      | 120 |      | 140 |      | 170 |      | 195 |
| +235 | 310 | +266 | 366 | +276 | 376 | +316 | 441 | +326 | 451 | -    | -   | -    | -   | -    | -   |
| +185 | 268 | +210 | 314 | +220 | 324 | +250 | 377 | +260 | 387 |      |     |      |     |      |     |
|      | 185 |      | 210 |      | 220 |      | 250 |      | 260 |      |     |      |     |      |     |
| +265 | 340 | +300 | 400 | +310 | 410 | +355 | 480 | +365 | 490 | -    | -   | -    | -   | -    | -   |
| +185 | 288 | +210 | 337 | +220 | 347 | +250 | 403 | +260 | 413 |      |     |      |     |      |     |
|      | 185 |      | 210 |      | 220 |      | 250 |      | 260 |      |     |      |     |      |     |
| 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     |
| -80  | 16  | -90  | 18  | -90  | 18  | -105 | 21  | -105 | 21  | -125 | 25  | -150 | 30  | -175 | 35  |
| 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     |
| -125 | 16  | -140 | 18  | -140 | 18  | -165 | 21  | -165 | 21  | -195 | 25  | -230 | 30  | -280 | 35  |
| 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     | 0    |     |
| -200 | 25  | -230 | 28  | -230 | 28  | -260 | 33  | -260 | 33  | -310 | 39  | -370 | 46  | -440 | 55  |

# Design of bearing arrangements

## Housing fits

| Nominal housing bore diameter in mm                                       |                          |                   |                          |                   |                          |                   |                          |                   |
|---|--------------------------|-------------------|--------------------------|-------------------|--------------------------|-------------------|--------------------------|-------------------|
| over<br>incl.   | <b>315</b><br><b>400</b> |                   | <b>400</b><br><b>500</b> |                   | <b>500</b><br><b>630</b> |                   | <b>630</b><br><b>800</b> |                   |
| Deviation of bearing outside diameter in $\mu\text{m}$ (normal tolerance) |                          |                   |                          |                   |                          |                   |                          |                   |
| $\Delta_{\text{Dmp}}$   | 0<br>-40                 |                   | 0<br>-45                 |                   | 0<br>-50                 |                   | 0<br>-75                 |                   |
| Housing deviation, fit interference or fit clearance in $\mu\text{m}$     |                          |                   |                          |                   |                          |                   |                          |                   |
| <b>E8</b>   | +214<br>+125             | 125<br>168<br>254 | +232<br>+135             | 135<br>182<br>277 | +255<br>+145             | 145<br>199<br>305 | +285<br>+160             | 160<br>227<br>360 |
| <b>F7</b>   | +119<br>+62              | 62<br>94<br>159   | +131<br>+68              | 68<br>104<br>176  | +146<br>+76              | 76<br>116<br>196  | +160<br>+80              | 80<br>132<br>235  |
| <b>G6</b>   | +54<br>+18               | 18<br>43<br>94    | +60<br>+20               | 20<br>48<br>105   | +66<br>+22               | 22<br>54<br>116   | +74<br>+24               | 24<br>66<br>149   |
| <b>G7</b>   | +75<br>+18               | 18<br>50<br>115   | +83<br>+20               | 20<br>56<br>128   | +92<br>+22               | 22<br>62<br>142   | +104<br>+24              | 24<br>76<br>179   |
| <b>H6</b>   | +36<br>0                 | 0<br>25<br>76     | +40<br>0                 | 0<br>28<br>85     | +44<br>0                 | 0<br>32<br>94     | +50<br>0                 | 0<br>42<br>125    |
| <b>H7</b>   | +57<br>0                 | 0<br>32<br>97     | +63<br>0                 | 0<br>36<br>108    | +70<br>0                 | 0<br>40<br>120    | +80<br>0                 | 0<br>52<br>155    |
| <b>H8</b>   | +89<br>0                 | 0<br>43<br>129    | +97<br>0                 | 0<br>47<br>142    | +110<br>0                | 0<br>54<br>160    | +125<br>0                | 0<br>67<br>200    |
| <b>J6</b>   | +29<br>-7                | 7<br>18<br>69     | +33<br>-7                | 7<br>21<br>78     | -                        | -                 | -                        | -                 |
| <b>J7</b>   | +39<br>-18               | 18<br>14<br>79    | +43<br>-20               | 20<br>16<br>88    | -                        | -                 | -                        | -                 |
| <b>JS6</b>  | +18<br>-18               | 18<br>6<br>58     | +20<br>-20               | 20<br>8<br>65     | +22<br>-22               | 22<br>10<br>72    | +25<br>-25               | 25<br>17<br>100   |
| <b>JS7</b>  | +28,5<br>-28,5           | 28,5<br>3<br>68,5 | +31,5<br>-31,5           | 31,5<br>4<br>76,5 | +35<br>-35               | 35<br>5<br>85     | +40<br>-40               | 40<br>12<br>115   |
| <b>K6</b>   | +7<br>-29                | 29<br>4<br>47     | +8<br>-32                | 32<br>4<br>53     | 0<br>-44                 | 44<br>12<br>50    | 0<br>-50                 | 50<br>8<br>75     |
| <b>K7</b>   | +17<br>-40               | 40<br>8<br>57     | +18<br>-45               | 45<br>9<br>63     | 0<br>-70                 | 70<br>30<br>50    | 0<br>-80                 | 80<br>28<br>75    |





| <b>800<br/>1000</b> |                   | <b>1000<br/>1250</b> |                   | <b>1250<br/>1600</b> |                   | <b>1600<br/>2000</b> |                   | <b>2000<br/>2500</b> |                   | <b>2500<br/>3150</b> |                   |
|---------------------|-------------------|----------------------|-------------------|----------------------|-------------------|----------------------|-------------------|----------------------|-------------------|----------------------|-------------------|
| 0<br>-100           |                   | 0<br>-125            |                   | 0<br>-160            |                   | 0<br>-200            |                   | 0<br>-250            |                   | 0<br>-300            |                   |
| +310<br>+170        | 170<br>250<br>410 | +360<br>+195         | 195<br>292<br>485 | +415<br>+220         | 220<br>338<br>575 | +470<br>+240         | 240<br>384<br>670 | +540<br>+260         | 260<br>436<br>790 | +620<br>+290         | 290<br>500<br>920 |
| +176<br>+86         | 86<br>149<br>276  | +203<br>+98          | 98<br>175<br>328  | +235<br>+110         | 110<br>205<br>395 | +270<br>+120         | 120<br>237<br>470 | +305<br>+130         | 130<br>271<br>555 | +355<br>+145         | 145<br>315<br>655 |
| +82<br>+26          | 26<br>78<br>182   | +94<br>+28           | 28<br>93<br>219   | +108<br>+30          | 30<br>109<br>268  | +124<br>+32          | 32<br>130<br>324  | +144<br>+34          | 34<br>154<br>394  | +173<br>+38          | 38<br>183<br>473  |
| +116<br>+26         | 26<br>89<br>216   | +133<br>+28          | 28<br>105<br>258  | +155<br>+30          | 30<br>125<br>315  | +182<br>+32          | 32<br>149<br>382  | +209<br>+34          | 34<br>175<br>459  | +248<br>+38          | 38<br>208<br>548  |
| +56<br>0            | 0<br>52<br>156    | +66<br>0             | 0<br>64<br>191    | +78<br>0             | 0<br>79<br>238    | +92<br>0             | 0<br>98<br>292    | +110<br>0            | 0<br>120<br>360   | +135<br>0            | 0<br>145<br>435   |
| +90<br>0            | 0<br>63<br>190    | +105<br>0            | 0<br>77<br>230    | +125<br>0            | 0<br>95<br>285    | +150<br>0            | 0<br>117<br>350   | +175<br>0            | 0<br>142<br>425   | +210<br>0            | 0<br>170<br>510   |
| +140<br>0           | 0<br>80<br>240    | +165<br>0            | 0<br>97<br>290    | +195<br>0            | 0<br>118<br>355   | +230<br>0            | 0<br>143<br>430   | +280<br>0            | 0<br>177<br>530   | +330<br>0            | 0<br>210<br>630   |
| -                   | -                 | -                    | -                 | -                    | -                 | -                    | -                 | -                    | -                 | -                    | -                 |
| -                   | -                 | -                    | -                 | -                    | -                 | -                    | -                 | -                    | -                 | -                    | -                 |
| +28<br>-28          | 28<br>24<br>128   | +33<br>-33           | 33<br>31<br>158   | +39<br>-39           | 39<br>40<br>199   | +46<br>-46           | 46<br>52<br>246   | +55<br>-55           | 55<br>65<br>305   | +67<br>-67           | 67<br>78<br>367   |
| +45<br>-45          | 45<br>18<br>145   | +52<br>-52           | 52<br>24<br>177   | +62<br>-62           | 62<br>32<br>222   | +75<br>-75           | 75<br>42<br>275   | +87<br>-87           | 87<br>54<br>337   | +105<br>-105         | 105<br>65<br>405  |
| 0<br>-56            | 56<br>4<br>100    | 0<br>-66             | 66<br>2<br>125    | 0<br>-78             | 78<br>1<br>160    | 0<br>-92             | 92<br>6<br>200    | 0<br>-110            | 110<br>10<br>250  | 0<br>-135            | 135<br>10<br>300  |
| 0<br>-90            | 90<br>27<br>100   | 0<br>-105            | 105<br>28<br>125  | 0<br>-125            | 125<br>30<br>160  | 0<br>-150            | 150<br>33<br>200  | 0<br>-175            | 175<br>34<br>250  | 0<br>-210            | 210<br>40<br>300  |

# Design of bearing arrangements

## Housing fits

| Nominal housing bore diameter in mm                                       |            |                 |            |                 |            |                  |            |                  |
|---|------------|-----------------|------------|-----------------|------------|------------------|------------|------------------|
| over  | <b>315</b> |                 | <b>400</b> |                 | <b>500</b> |                  | <b>630</b> |                  |
| incl.   | <b>400</b> |                 | <b>500</b> |                 | <b>630</b> |                  | <b>800</b> |                  |
| Deviation of bearing outside diameter in $\mu\text{m}$ (normal tolerance) |            |                 |            |                 |            |                  |            |                  |
| $\Delta_{Dmp}$  | 0          |                 | 0          |                 | 0          |                  | 0          |                  |
|   | -40        |                 | -45        |                 | -50        |                  | -75        |                  |
| Housing deviation, fit interference or fit clearance in $\mu\text{m}$     |            |                 |            |                 |            |                  |            |                  |
| <b>M6</b>   | -10        | <b>46</b>       | -10        | <b>50</b>       | -26        | <b>70</b>        | -30        | <b>80</b>        |
|   | -46        | <b>21</b><br>30 | -50        | <b>22</b><br>35 | -70        | <b>38</b><br>24  | -80        | <b>38</b><br>45  |
| <b>M7</b>   | 0          | <b>57</b>       | 0          | <b>63</b>       | -26        | <b>96</b>        | -30        | <b>110</b>       |
|   | -57        | <b>25</b><br>40 | -63        | <b>27</b><br>45 | -96        | <b>56</b><br>24  | -110       | <b>58</b><br>45  |
| <b>N6</b>   | -26        | <b>62</b>       | -27        | <b>67</b>       | -44        | <b>88</b>        | -50        | <b>100</b>       |
|   | -62        | <b>37</b><br>14 | -67        | <b>39</b><br>18 | -88        | <b>56</b><br>6   | -100       | <b>58</b><br>25  |
| <b>N7</b>   | -16        | <b>73</b>       | -17        | <b>80</b>       | -44        | <b>114</b>       | -50        | <b>130</b>       |
|   | -73        | <b>41</b><br>24 | -80        | <b>44</b><br>28 | -114       | <b>74</b><br>6   | -130       | <b>78</b><br>25  |
| <b>P6</b>   | -51        | <b>87</b>       | -55        | <b>95</b>       | -78        | <b>122</b>       | -88        | <b>138</b>       |
|   | -87        | <b>62</b><br>11 | -95        | <b>67</b><br>10 | -122       | <b>90</b><br>28  | -138       | <b>96</b><br>13  |
| <b>P7</b>   | -41        | <b>98</b>       | -45        | <b>108</b>      | -78        | <b>148</b>       | -88        | <b>168</b>       |
|   | -98        | <b>66</b><br>1  | -108       | <b>72</b><br>0  | -148       | <b>108</b><br>28 | -168       | <b>126</b><br>13 |



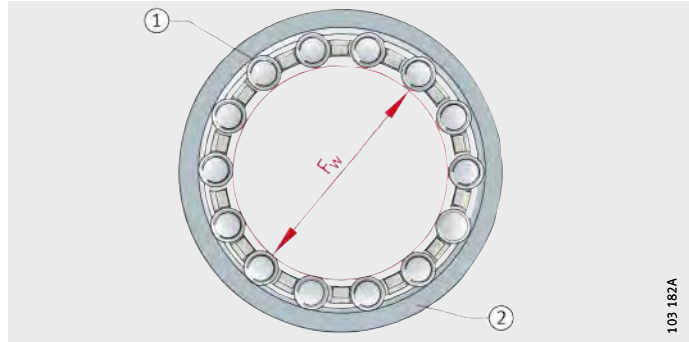
| <b>800<br/>1000</b> |                               | <b>1000<br/>1250</b> |                               | <b>1250<br/>1600</b> |                                | <b>1600<br/>2000</b> |                                 | <b>2000<br/>2500</b> |                                 | <b>2500<br/>3150</b> |                                 |
|---------------------|-------------------------------|----------------------|-------------------------------|----------------------|--------------------------------|----------------------|---------------------------------|----------------------|---------------------------------|----------------------|---------------------------------|
| 0<br>-100           |                               | 0<br>-125            |                               | 0<br>-160            |                                | 0<br>-200            |                                 | 0<br>-250            |                                 | 0<br>-300            |                                 |
| -34<br>-90          | <b>90</b><br><b>38</b><br>66  | -40<br>-106          | <b>106</b><br><b>45</b><br>85 | -48<br>-126          | <b>126</b><br><b>47</b><br>112 | -58<br>-150          | <b>150</b><br><b>52</b><br>142  | -68<br>-178          | <b>178</b><br><b>58</b><br>182  | -76<br>-211          | <b>211</b><br><b>66</b><br>224  |
| -34<br>-124         | <b>124</b><br><b>61</b><br>66 | -40<br>-145          | <b>145</b><br><b>68</b><br>85 | -48<br>-173          | <b>173</b><br><b>78</b><br>112 | -58<br>-208          | <b>208</b><br><b>91</b><br>142  | -68<br>-243          | <b>243</b><br><b>102</b><br>182 | -76<br>-286          | <b>286</b><br><b>116</b><br>224 |
| -56<br>-112         | <b>112</b><br><b>60</b><br>44 | -66<br>-132          | <b>132</b><br><b>67</b><br>59 | -78<br>-156          | <b>156</b><br><b>77</b><br>82  | -92<br>-184          | <b>184</b><br><b>86</b><br>108  | -110<br>-220         | <b>220</b><br><b>100</b><br>140 | -135<br>-270         | <b>270</b><br><b>125</b><br>165 |
| -56<br>-146         | <b>146</b><br><b>83</b><br>44 | -66<br>-171          | <b>171</b><br><b>94</b><br>59 | -78<br>-203          | <b>203</b><br><b>108</b><br>82 | -92<br>-242          | <b>242</b><br><b>125</b><br>108 | -110<br>-285         | <b>285</b><br><b>144</b><br>140 | -135<br>-345         | <b>345</b><br><b>175</b><br>165 |
| -100<br>-156        | <b>156</b><br><b>104</b><br>0 | -120<br>-186         | <b>186</b><br><b>121</b><br>5 | -140<br>-218         | <b>218</b><br><b>139</b><br>20 | -170<br>-262         | <b>262</b><br><b>164</b><br>30  | -195<br>-305         | <b>305</b><br><b>185</b><br>55  | -240<br>-375         | <b>375</b><br><b>230</b><br>60  |
| -100<br>-190        | <b>190</b><br><b>127</b><br>0 | -120<br>-225         | <b>225</b><br><b>148</b><br>5 | -140<br>-265         | <b>265</b><br><b>159</b><br>20 | -170<br>-320         | <b>320</b><br><b>203</b><br>30  | -195<br>-370         | <b>370</b><br><b>229</b><br>55  | -240<br>-450         | <b>450</b><br><b>280</b><br>60  |

# Design of bearing arrangements

## Enveloping circle

For bearings without an inner ring, the enveloping circle  $F_w$  is used. This is the inner inscribed circle of the cylindrical rollers in clearance-free contact with the outer raceway, *Figure 14*. Before the bearings are mounted, it is in the tolerance zone F6. Deviations for F6, see table.

- ① Cylindrical roller
  - ② Outer raceway
- $F_w$  = enveloping circle diameter



*Figure 14*  
Enveloping circle

### Deviations for the enveloping circle diameter

| Enveloping circle diameter $F_w$<br>mm |       | Tolerance zone F6                              |                                  |
|--|-------|--|----------------------------------|
|  |       | Tolerance for enveloping circle diameter $F_w$ |                                  |
| over                                   | incl. | Upper deviation<br>$\mu\text{m}$               | Lower deviation<br>$\mu\text{m}$ |
| 250                                    | 315   | +88  | +56                              |
| 315                                    | 400   | +98  | +62                              |
| 400                                    | 500   | +108   | +68                              |
| 500                                    | 630   | +120   | +76                              |
| 630                                    | 800   | +130   | +80                              |
| 800                                    | 1 000 | +142   | +86                              |
| 1 000                                  | 1 250 | +164   | +98                              |
| 1 250                                  | 1 600 | +188   | +110                             |
| 1 600                                  | 2 000 | +212   | +120                             |

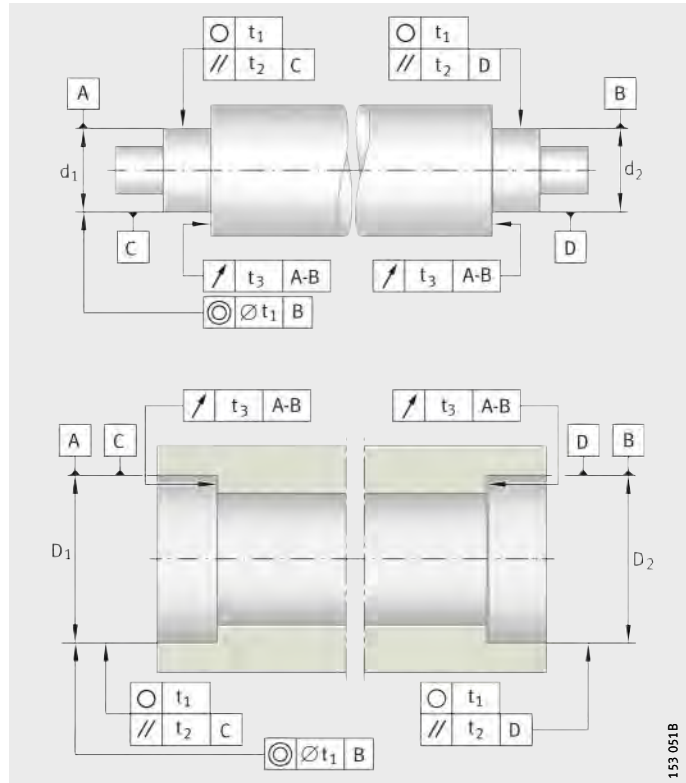


## Geometrical tolerances of bearing seating surfaces

In order to achieve the required fit, the bearing seats and fit surfaces of the shaft and housing bore must conform to certain tolerances, *Figure 15* and table, page 148.

$t_1$  = roundness  
 $t_2$  = parallelism  
 $t_3$  = axial runout of abutment shoulders

*Figure 15*  
 Dimensional and geometrical tolerances



## Accuracy of bearing seating surfaces

The degree of accuracy for the bearing seat tolerances on the shaft and in the housing is given in the table, page 148, and by the ISO fundamental tolerances (ISO 286-1:1988).

### Second bearing seat

The tolerances for a second bearing seat on the shaft ( $d_2$ ) or in the housing ( $D_2$ ) (expressed in terms of coaxiality to DIN ISO 1101) must be based on the angular adjustment facility of the bearing. Misalignments due to elastic deformation of the shaft and housing must be taken into consideration.

### Housings

For split housings, the joints must be free from burrs.

The accuracy of the bearing seats is determined as a function of the accuracy of the bearing selected.

# Design of bearing arrangements

## Geometrical tolerances of bearing seating surfaces

| Bearing tolerance class | Bearing seating surface | Diameter tolerance | Roundness tolerance        | Parallelism tolerance | Abutment shoulder face runout |
|-------------------------|-------------------------|--------------------|----------------------------|-----------------------|-------------------------------|
|                         |                         |                    | $t_1$                      | $t_2$                 | $t_3$                         |
| PN<br>P6X               | Shaft                   | IT6 (IT5)          | Circumferential load IT4/2 | IT4                   | IT4                           |
|                         |                         |                    | Point load IT5/2           | IT5                   |                               |
|                         | Housing                 | IT7 (IT6)          | Circumferential load IT5/2 | IT5                   | IT5                           |
|                         |                         |                    | Point load IT6/2           | IT6                   |                               |
| P5                      | Shaft                   | IT5                | Circumferential load IT3/2 | IT2                   | IT2                           |
|                         |                         |                    | Point load IT4/2           | IT3                   |                               |
|                         | Housing                 | IT6                | Circumferential load IT4/2 | IT3                   | IT3                           |
|                         |                         |                    | Point load IT5/2           | IT4                   |                               |
| P4<br>SP                | Shaft                   | IT4                | Circumferential load IT2/2 | IT1                   | IT1                           |
|                         |                         |                    | Point load IT3/2           | IT2                   |                               |
|                         | Housing                 | IT5                | Circumferential load IT3/2 | IT2                   | IT2                           |
|                         |                         |                    | Point load IT4/2           | IT3                   |                               |
| UP<br>P4S               | Shaft                   | IT3                | Circumferential load IT1/2 | IT0                   | IT0                           |
|                         |                         |                    | Point load IT2/2           | IT1                   |                               |
|                         | Housing                 | IT4                | Circumferential load IT2/2 | IT1                   | IT1                           |
|                         |                         |                    | Point load IT3/2           | IT2                   |                               |

ISO fundamental tolerances (IT grades) to ISO 286-1:1988, see page 150.



### Roughness of bearing seats

The roughness of the bearing seats must be matched to the tolerance class of the bearings. The mean roughness value  $R_a$  must not be too high, in order to maintain the interference loss within limits. Shafts should be ground and bores should be precision turned. Guide values: see table.

The bore and shaft tolerances and permissible roughness values are also given in the design and safety guidelines in the product sections. The guide values for roughness correspond to DIN 5 425-1.

### Guide values for roughness of bearing seating surfaces

| Diameter of bearing seat d (D) mm |       | Recommended mean roughness values $R_a$ <sup>2)</sup> for ground bearing seats<br>Corresponding diameter tolerance $\mu\text{m}$ |          |          |          |
|-----------------------------------|-------|--|----------|----------|----------|
| over                              | incl. | IT7  | IT6      | IT5      | IT4      |
| 80                                | 500   | 1,6 (N7)   | 1,6 (N7) | 0,8 (N6) | 0,4 (N5) |
| 500                               | 1 250 | 3,2 (N8) <sup>1)</sup>   | 1,6 (N7) | 1,6 (N7) | 0,8 (N6) |

<sup>1)</sup> When mounting is carried out using the hydraulic method,  $R_a = 1,6 \mu\text{m}$  should not be exceeded.

<sup>2)</sup> The values in brackets are roughness classes to DIN ISO 1302.

# Design of bearing arrangements

## Values for IT grades

The table shows numerical values for the ISO fundamental tolerances (IT grades) to ISO 286-1:1988.

### IT grades and values

| Nominal dimension in mm |     |     |     |     |
|-------------------------|-----|-----|-----|-----|
| over                    | 120 | 180 | 250 | 315 |
| incl.                   | 180 | 250 | 315 | 400 |
| Values in $\mu\text{m}$ |     |     |     |     |
| <b>IT0</b>              | 2   | 3   | 4   | 5   |
| <b>IT1</b>              | 3,5 | 4,5 | 6   | 7   |
| <b>IT2</b>              | 5   | 7   | 8   | 9   |
| <b>IT3</b>              | 8   | 10  | 12  | 13  |
| <b>IT4</b>              | 12  | 14  | 16  | 18  |
| <b>IT5</b>              | 18  | 20  | 23  | 25  |
| <b>IT6</b>              | 25  | 29  | 32  | 36  |
| <b>IT7</b>              | 40  | 46  | 52  | 57  |
| <b>IT8</b>              | 63  | 72  | 81  | 89  |
| <b>IT9</b>              | 100 | 115 | 130 | 140 |
| <b>IT10</b>             | 160 | 185 | 210 | 230 |
| <b>IT11</b>             | 250 | 290 | 320 | 360 |
| <b>IT12</b>             | 400 | 460 | 520 | 570 |





| <b>400</b> | <b>500</b> | <b>630</b> | <b>800</b>   | <b>1 000</b> | <b>1 250</b> | <b>1 600</b> | <b>2 000</b> | <b>2 500</b> |
|------------|------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>500</b> | <b>630</b> | <b>800</b> | <b>1 000</b> | <b>1 250</b> | <b>1 600</b> | <b>2 000</b> | <b>2 500</b> | <b>3 150</b> |
| 6          | -          | -          | -            | -            | -            | -            | -            | -            |
| 8          | -          | -          | -            | -            | -            | -            | -            | -            |
| 10         | -          | -          | -            | -            | -            | -            | -            | -            |
| 15         | -          | -          | -            | -            | -            | -            | -            | -            |
| 20         | -          | -          | -            | -            | -            | -            | -            | -            |
| 27         | 29         | 32         | 36           | 47           | 50           | 60           | 70           | 86           |
| 40         | 44         | 50         | 56           | 66           | 78           | 92           | 110          | 135          |
| 63         | 70         | 80         | 90           | 105          | 125          | 150          | 175          | 210          |
| 97         | 110        | 125        | 140          | 165          | 195          | 230          | 280          | 330          |
| 155        | 175        | 200        | 230          | 260          | 310          | 370          | 440          | 540          |
| 250        | 280        | 320        | 360          | 420          | 500          | 600          | 700          | 860          |
| 400        | 440        | 500        | 560          | 660          | 780          | 920          | 1100         | 1350         |
| 630        | 700        | 800        | 900          | 1 050        | 1 250        | 1 500        | 1 750        | 2 100        |

# Design of bearing arrangements

## Raceways for bearings without inner and/or outer ring



In rolling bearings which do not have an inner and/or outer ring to provide a raceway, the rolling elements run directly on the shaft or in the housing bore.

The shaft and housing bore must be suitable for use as rolling bearing raceways.

The raceways must always be free from undulations and precision machined (grinding and honing). At a mean roughness  $R_a > 0,2 \mu\text{m}$ , it is not possible to utilise the full load carrying capacity of the bearings.

The guidelines on shaft design in the product sections must also be observed.

The diameter tolerances of the shaft and housing determine the internal clearance.

## Materials for raceways Through hardening steels

Through hardening steels to ISO 683-17 (such as 100Cr6) are suitable as materials for rolling bearing raceways in direct bearing arrangements. These steels can also be surface layer hardened.

## Case hardening steels

Case hardening steels must conform to ISO 683-17 (such as 17MnCr5, 16CrNiMo6) or EN 10 084 (such as 16MnCr5).

## Flame or induction hardening

For flame and induction hardening, steels to ISO 683-17 (such as Cf54, 43CrMo4) or DIN 17 212 (such as Cf53) must be used.



### Surface hardness and hardening depth

The values apply to raceways, axial washers and shaft shoulders. Steels hardened by means of case, flame or induction hardening must have a surface hardness of 670 HV + 170 HV and a sufficient hardening depth CHD or SHD.

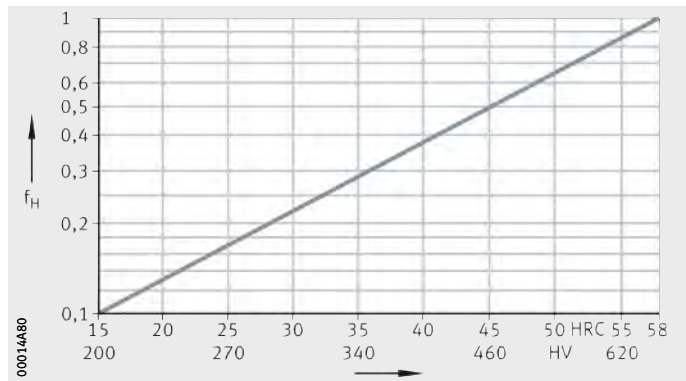
In accordance with DIN 50 190, the hardening depth is the depth of the hardened surface zone at which there is still a hardness of 550 HV. It is measured on the finish ground shaft and must correspond to the stated values, but must in any case be  $\geq 0,3$  mm.



If the raceways are softer than 650 HV (58 HRC), the bearing arrangement will not achieve the full load carrying capacity. In this case, the basic dynamic load rating  $C_r$  and the basic static load rating  $C_{0r}$  must be reduced by the factor  $f_H$ , *Figure 16*.

$f_H$  = factor for taking account of raceway hardness  
HRC, HV = surface hardness

*Figure 16*  
Taking account of the raceway hardness



# Design of bearing arrangements

## Hardness curves

The hardness curves are shown schematically, *Figure 17* and *Figure 18*. The required hardness curve is derived from the strain on the material.

The equations are based on hardness curves achieved with normal specialist heat treatment.

Case hardening:

$$\text{CHD} \geq 0,078 \cdot D_w$$

Flame or induction hardening:

$$\text{SHD} \geq 140 \cdot D_w / R_{p0,2}$$

CHD mm  
Case hardening depth

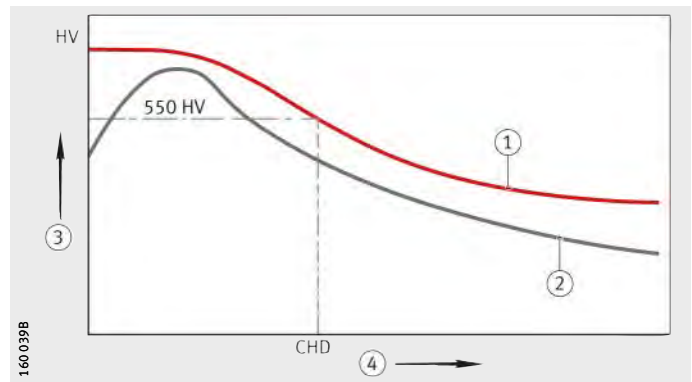
SHD mm  
Surface hardening depth

$D_w$  mm  
Rolling element diameter

$R_{p0,2}$  N/mm<sup>2</sup>  
Proof stress.

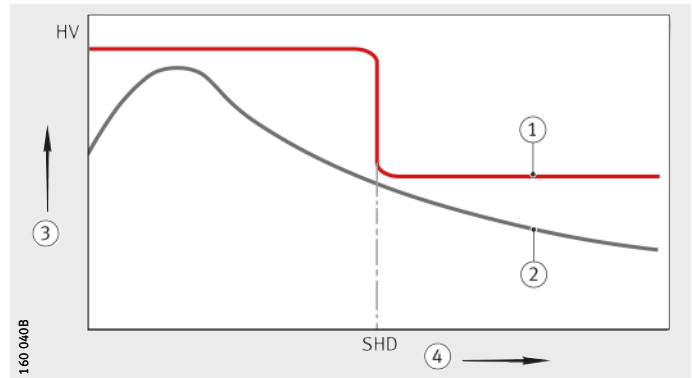
$R_{p0,2}$  N/mm<sup>2</sup>  
Proof stress.

- ① Case hardening
  - ② Required hardness
  - ③ Hardness
  - ④ Distance from surface
- CHD = case hardening depth with hardness 550 HV



*Figure 17*  
Case hardening depth CHD and hardness curve

- ① Flame or induction hardening
  - ② Required hardness
  - ③ Hardness
  - ④ Distance from surface
- SHD = surface hardening depth



*Figure 18*  
Surface hardening depth SHD and hardness curve



## Axial location of bearings

Axial location of the bearing rings is matched to the specific bearing arrangement (locating bearing, non-locating bearing, adjusted and floating arrangements of bearings).

Examples: see *Figure 19*, page 156 to *Figure 25*, page 158.

### Design guidelines



The bearing rings must be located by force locking or form fit in order to prevent lateral movement. The bearing rings must only be in contact with the shaft or housing shoulder, but not with the fillet. Every radius of the mating part must be smaller than the smallest chamfer dimension  $r$  or  $r_1$  of the bearing.

The radius should have rounding to DIN 5 418 or an undercut to DIN 509.

The shoulders on the mating parts must be large enough to provide a sufficiently wide contact surface even with the largest chamfer dimension of the bearing (DIN 5 418).

The bearing tables give the maximum values for the radius  $r_a$  or  $r_{a1}$  and the diameters of the abutment shoulders ( $D_a$  or  $d_a$ ).

Any special characteristics of the individual bearing types, e.g. for cylindrical roller bearings, tapered roller bearings and axial bearings are indicated in the product sections.

### Locating bearings

Locating bearings can support axial forces. The retaining element must be matched to these axial forces. Shoulders on the shaft and housing, snap rings, housing covers, shaft covers, nuts and spacer rings are suitable.

### Non-locating bearings

Non-locating bearings only need to support slight axial forces occurring in thermal expansion. The axial location method only needs to prevent creep of the rings. A tight fit is often sufficient.

### Self-retaining bearings

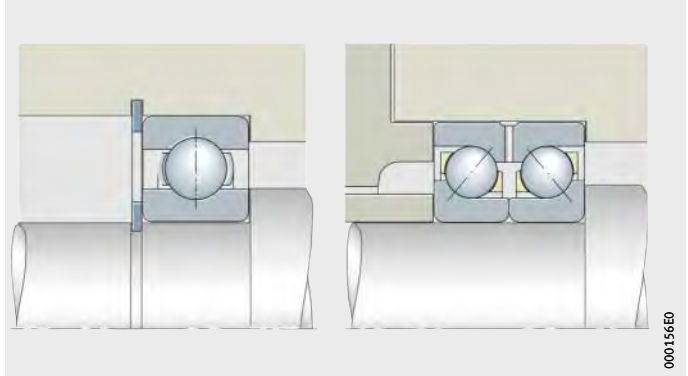
In non-separable bearings, one bearing ring requires a tight fit, while the other ring is retained by the rolling elements.

# Design of bearing arrangements

Deep groove ball bearings,  
double row angular  
contact ball bearings

Supported on both sides,  
inner and outer rings

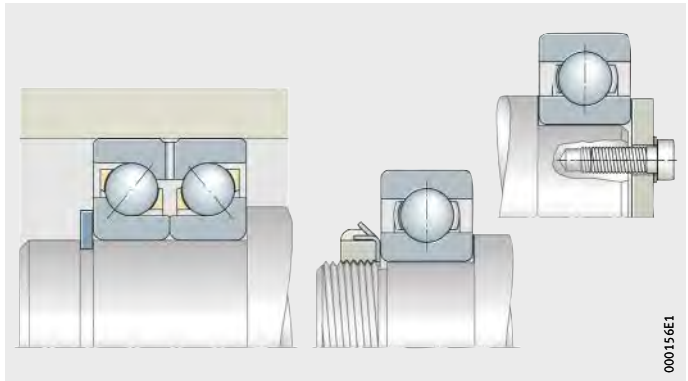
*Figure 19*  
Locating bearings



000156E0

Supported on both sides,  
inner ring

*Figure 20*  
Non-locating bearings



000156E1



### Cylindrical roller bearings

The bearings must be supported on both sides on the inner and outer rings, *Figure 21* to *Figure 23*, page 157.

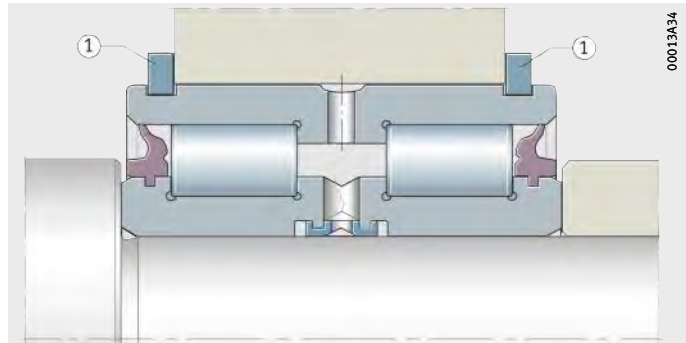
The ribs of axially loaded cylindrical roller bearings must be supported up to dimension  $d_1$  or  $D_1$ .

Dimensions  $d_1$ ,  $D_1$ : see dimension tables.

For semi-locating bearings, the bearing rib only requires support on one side, on the rib supporting the axial load.

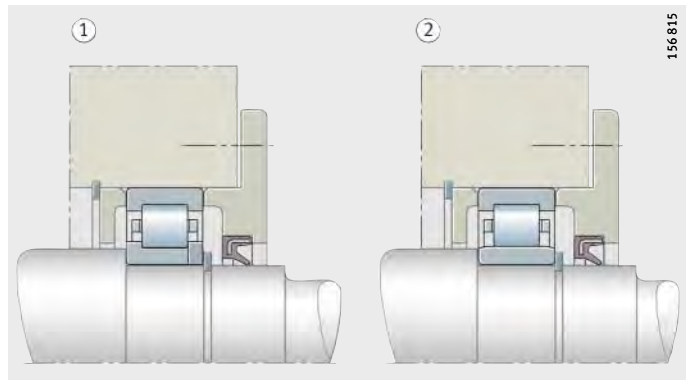
Outer ring axially located by retaining rings  
① Retaining rings

*Figure 21*  
Locating bearing



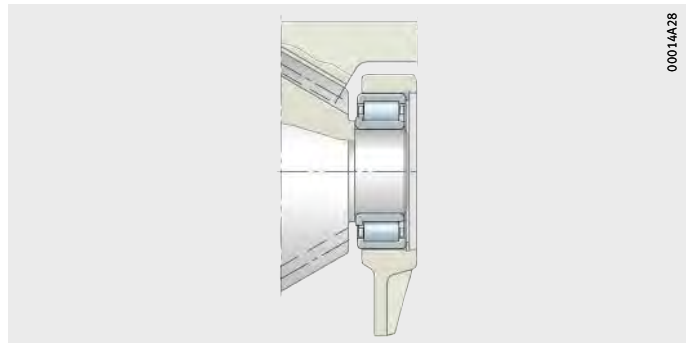
Axial location by form fit  
① Locating bearing  
② Non-locating bearing

*Figure 22*  
Locating and non-locating bearings



The inner ring rib prevents axial creep to one side

*Figure 23*  
Non-locating bearing



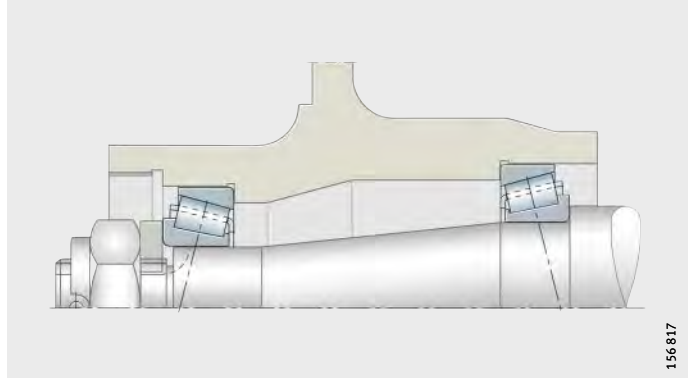
# Design of bearing arrangements

## Adjusted and floating bearing arrangements

Since bearings in adjusted and floating arrangements support axial forces in one direction only, the bearing rings only need to be supported on one side. Counterguidance is performed by a second, symmetrically arranged bearing, *Figure 24* and *Figure 25*. Shaft nuts, ring nuts, covers or spacer washers are suitable as adjustment elements.

In floating bearing arrangements, lateral movement of the rings is prevented by shaft or housing shoulders, covers, snap rings, *Figure 25*.

Axial location

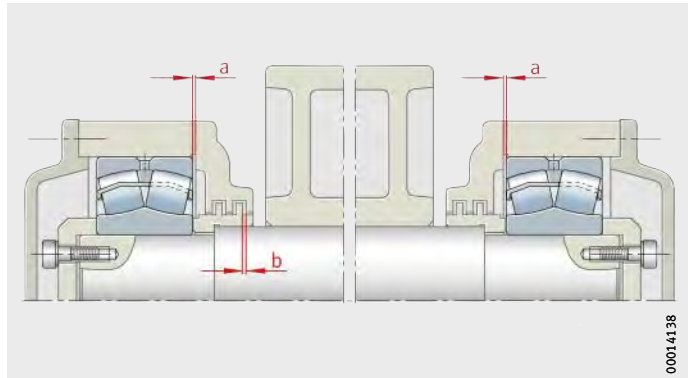


*Figure 24*  
Adjusted bearing arrangement

156817

Axial location

a = guidance clearance;  
a < b (b = axial labyrinth gap)



*Figure 25*  
Floating bearing arrangement

00014138





**Seals** The sealing arrangement has a considerable influence on the operating life of a bearing arrangement. It is intended to retain the lubricant in the bearing and prevent the ingress of contaminants into the bearing.

Contaminants may have various effects:

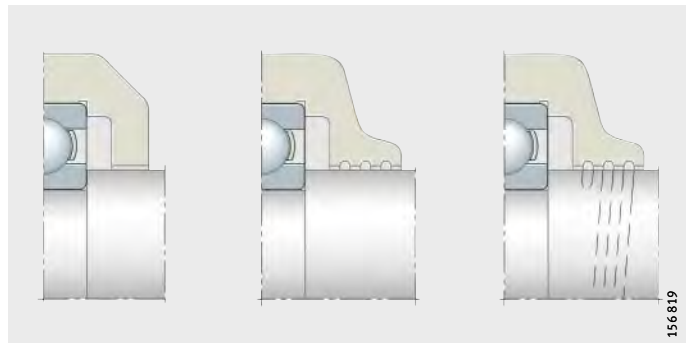
- A large quantity of very small, abrasive particles causes wear in the bearing. The increase in clearance or noise brings the operating life of the bearing to an end.
- Large, overrolled hard particles reduce the fatigue life since pittings occur at the indentation points under high bearing loads.

A basic distinction is made between contact and non-contact seals in the adjacent construction and the bearing.

### Non-contact seals in the adjacent construction

With non-contact seals, only lubricant friction occurs in the lubrication gap. The seals do not undergo wear and remain capable of operation for a long period. Since they generate no heat, non-contact seals are also suitable for very high speeds.

**Gap seals** A simple design, although adequate in many cases, is a narrow seal gap between the shaft and housing, *Figure 26*.

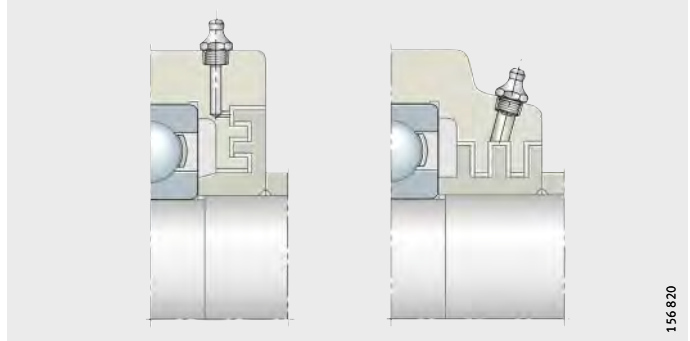


*Figure 26*  
Simple gap seals

# Design of bearing arrangements

## Labyrinth seals

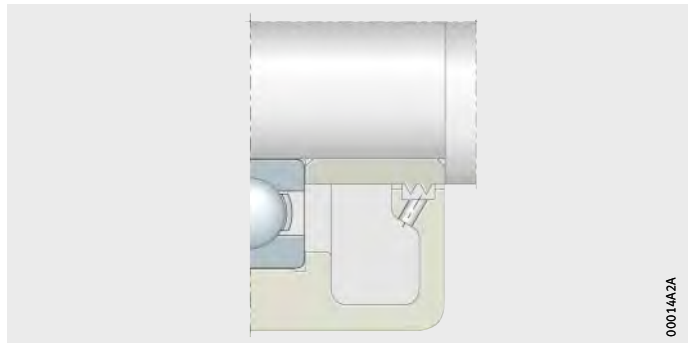
A considerably greater sealing effect than with gap seals is achieved by labyrinths incorporating gaps filled with grease, *Figure 27*. In contaminated environments, grease should be pressed from the interior into the seal gap at short intervals.



*Figure 27*  
Labyrinth seals

## Splash ring

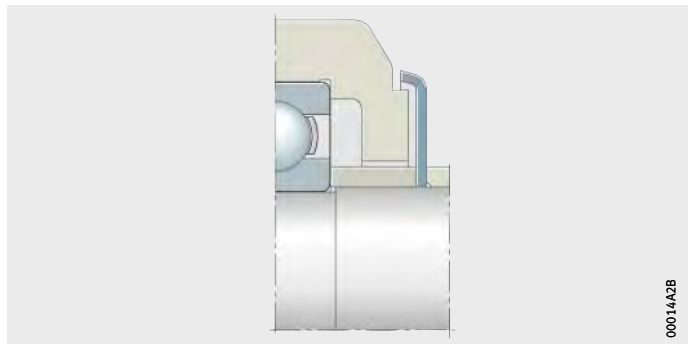
Where oil lubrication is used with a horizontal shaft, splash rings are suitable for preventing the escape of oil, *Figure 28*. The oil outlet hole on the underside of the seal location must be sufficiently large that it cannot be clogged by contamination.



*Figure 28*  
Splash ring

## Flinger shields

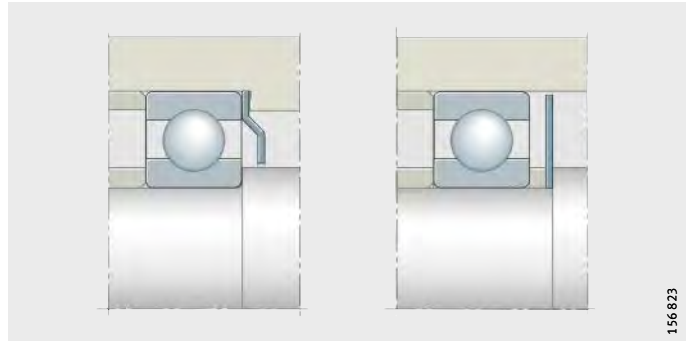
Co-rotating flinger shields have the effect of shielding the seal gap from heavy contamination, *Figure 29*.



*Figure 29*  
Flinger shield

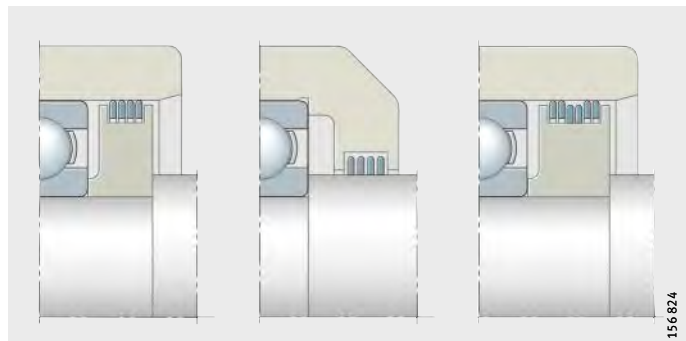


**Baffle plates** Stationary (rigid) baffle plates ensure that grease remains in the area around the bearing, *Figure 30*.  
The grease collar that forms at the seal gap protects the bearing against contamination.



*Figure 30*  
Rigid baffle plates

**Lamellar rings** Lamellar rings made from steel and radially sprung either outwards or inwards require little mounting space, *Figure 31*.  
They give protection against loss of grease and ingress of dust and are also used as an outer seal against spray water.



*Figure 31*  
Lamellar rings

# Design of bearing arrangements

## Non-contact seals in the bearing

### Sealing shields in the bearing

Sealing shields are compact sealing elements fitted on one or both sides of the bearing.

Bearings with sealing shields on both sides are supplied with a grease filling.

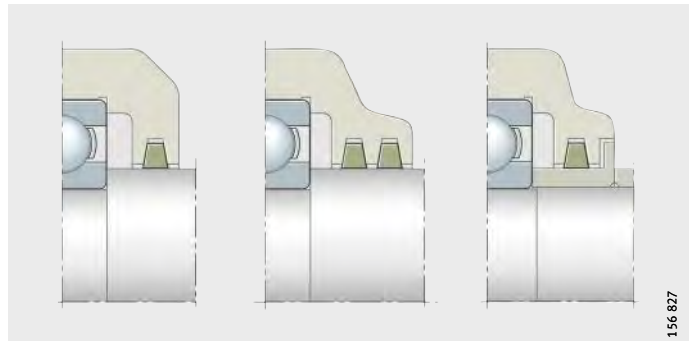
We supply large bearings fitted with sealing shields by agreement only.

## Contact seals in the adjacent construction

Contact seals are normally in contact with the running surface under radial contact force. The contact force should be kept small to avoid an excessive increase in frictional torque and temperature. The frictional torque and temperature as well as the wear of the seal are also affected by the lubrication condition at the running surface, its roughness and the sliding velocity.

### With grease lubrication

Felt rings and felt strips are sealing elements that have proved very effective with grease lubrication, *Figure 32*. They are impregnated with oil before mounting and give particularly good sealing against dust. In unfavourable environmental conditions, two felt rings are arranged adjacent to each other. Felt rings and annular slots are standardised according to DIN 5 419.

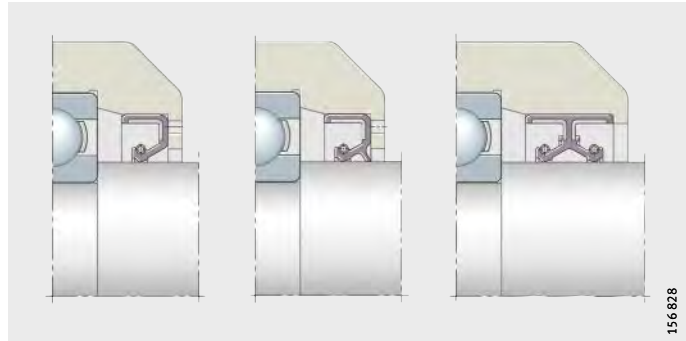


*Figure 32*  
Felt rings or felt strips



### With oil lubrication

If oil lubrication is used, sealing is primarily carried out with rotary shaft seals to DIN 3 760 und DIN 3 761, *Figure 33*. The seal collar with one lip is pressed against the shaft running surface by a spring. If the principal objective is to prevent escape of lubricant, the lip is arranged on the inner side of the bearing arrangement. A sealing ring with an additional protective lip also prevents the ingress of contamination. Seal lips made from nitrile butadiene rubber (NBR) are suitable, when used with oil lubrication, for circumferential speeds at the running surface of up to 12 m/s.



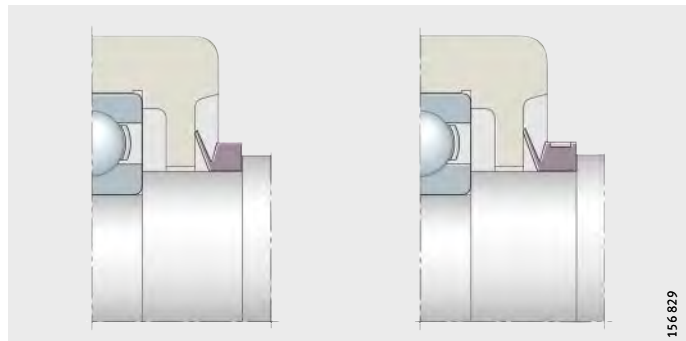
*Figure 33*  
Rotary shaft seals

### Lip seal with axial sealing action

The V ring, *Figure 34*, is a lip seal with axial sealing action. During mounting, this single piece rubber ring is pushed under tension along the shaft until its lip is in axial contact with the housing wall. The seal lip acts simultaneously as a flinger shield. Axial lip seals are unaffected by radial misalignment and slight skewing of the shaft.

Rotating V rings are suitable, when used with grease lubrication, for circumferential speeds of up to 12 m/s, while stationary V rings are suitable for up to 20 m/s. At circumferential speeds over 8 m/s, the V ring must be axially supported; at speeds of 12 m/s or more it must also be radially clamped.

V rings are frequently used as outer seals in order to keep contamination away from a rotary shaft seal.

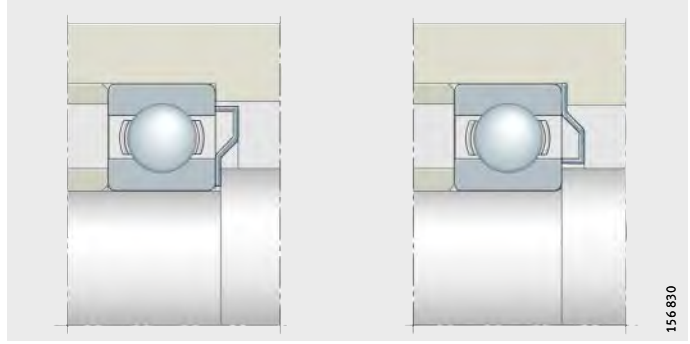


*Figure 34*  
V ring

## Design of bearing arrangements

### Axial spring seals

When using grease lubrication, effective sealing can also be achieved by means of axial spring seals, *Figure 35*. The thin sheet metal washers are clamped to the end face of the inner ring or outer ring and are axially sprung against the other bearing ring.



*Figure 35*  
Spring seals

156830



## Contact seals in the bearing

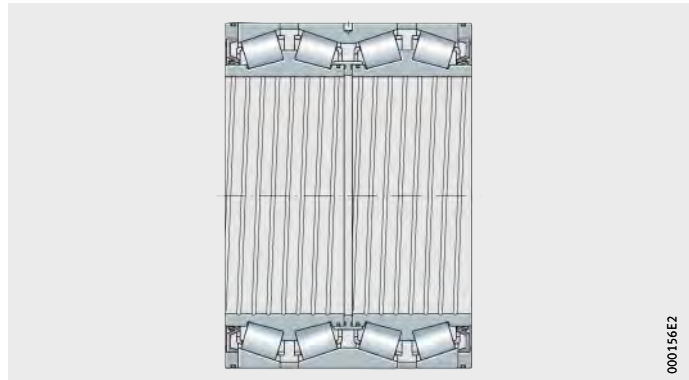
### Sealing washers

Work roll bearing arrangements in hot or cold rolling lines must be effectively sealed against large quantities of water or roll coolant that are mixed with contaminants. These bearing arrangements are normally lubricated with grease. For cost and environmental reasons, it is desirable to achieve low levels of grease consumption. Four-row tapered roller bearings with integrated seals have therefore been developed, *Figure 36*. These bearings have main dimensions identical to those of the unsealed bearings.

Only small quantities of the high quality rolling bearing grease used are required. Although the basic load ratings of the sealed bearings are lower, they normally have a longer life than the open bearings due to the improved cleanliness in the lubrication gap.



The rotary shaft seals on the sealed bearings are made from fluoro elastomer, which can give off gases and vapours harmful to health at approx. +300 °C or higher. This may occur, for example, if a welding torch is used in the dismantling of the bearings. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the material.



*Figure 36*  
Sealing washers on both sides

# Mounting and dismounting

## Handling

Rolling bearings, rolling bearing parts and Arcanol rolling bearing greases are high quality goods and must therefore be handled with care.

## Storage of rolling bearings

The performance capability of modern rolling bearings lies at the boundaries of what is technically achievable. The materials, dimensional and geometrical tolerances, surface quality and lubrication have been optimised for maximum levels of function, which means that even slight deviations in functional areas, such as those caused by corrosion, can impair the performance capacity. In order to realise the full performance capability of rolling bearings, it is essential to match the anti-corrosion protection, packaging, storage and handling to each other.

Corrosion protection and packaging constitute part of the bearing and are optimised such that they preserve all characteristics of the product at the same time as far as possible.

In addition to protecting the surface against corrosion, this includes emergency running lubrication, friction, lubricant compatibility, noise behaviour, resistance to ageing and compatibility with rolling bearing components (cage and seal material).

## Storage conditions for rolling bearings



As a basic prerequisite, parts must be stored in a closed storage area which cannot be affected by any aggressive media, such as exhaust gases from vehicles or gases, mist or aerosols of acids, lyes or salts. Direct sunlight should be avoided since, apart from the harmful effects of UV radiation, it can lead to wide temperature fluctuations in the packaging. The temperature should be constant and air humidity should be as low as possible. Jumps in temperature and increased humidity lead to condensation.

The following conditions must be fulfilled:

- frost-free storage, i. e. at a temperature  $> +5\text{ °C}$   
(to prevent formation of white frost, a limit of  $+2\text{ °C}$  is permissible for a maximum of 12 hours per day)
- maximum temperature  $+40\text{ °C}$   
(to prevent excessive drainage of anti-corrosion oils)
- relative humidity  $< 65\%$   
(if changes in temperature occur, a limit of 70% is permissible for up to 12 hours per day).

The temperature and humidity must be continuously monitored. This can be carried out using a datalogger. The measurements must be taken at intervals of no more than 2 hours.

At least 2 measurement points must be selected: the highest point and the lowest point in the vicinity of an external wall at which the goods can be stored.

Larger bearings with rings of relatively small thickness should not be stored standing but lying flat and supported over their whole circumference.





**Storage periods  
for rolling bearings**

Rolling bearings should not be stored for longer than 3 years. This applies both to open and to greased bearings with sealing shields or washers. In particular, specifically greased rolling bearings should not be stored for too long, since the chemical-physical behaviour of greases may change during storage. Even if the minimum performance capacity remains, the safety reserves of the grease may have diminished.

In general, rolling bearings can be used even after their permissible storage period has been exceeded if the storage conditions during storage and transport were observed.

If the conditions are not fulfilled, shorter storage periods must be anticipated. If the periods are exceeded, it is recommended that the bearing should be checked for corrosion, the condition of the anti-corrosion oil and the condition of the grease before it is used.

**Storage  
of Arcanol rolling bearing  
greases**

The information on storage of rolling bearings apply as appropriate to Arcanol rolling bearing greases. The precondition is that the grease is stored in closed, completely filled original containers.

**Storage periods  
for Arcanol rolling bearing greases**

Rolling bearing greases are mixtures of oil, thickener and additives. Such mixtures of liquid and solid substances do not have unlimited stability. During storage, their chemical-physical characteristics may change and they should therefore be used up as soon as possible.

If the storage conditions are observed, Arcanol lubricating greases can be stored without loss of performance for 3 years. As in the case of rolling bearings, however, the permissible storage period should not be seen as a rigid limit.

If storage is carried out as prescribed, most greases can be used even after 3 years, if allowances are made for small changes.

If there is any doubt when using older greases, random sample checking of chemical-physical characteristics is recommended in order to determine any changes in the grease.

It is therefore not possible to state storage periods for containers that have been opened. If containers are to be stored after opening, the grease surface should always be brushed flat, the container should be sealed airtight and it should be stored such that the empty space is upwards. High temperatures should be avoided in all cases.

# Mounting and dismounting

## Unpacking of rolling bearings

Perspiration leads to corrosion. Hands should be kept clean and dry and protective gloves worn if necessary. Bearings should only be removed from their original packaging immediately before mounting. If bearings are removed from multi-item packaging with dry preservation, the package must be closed again immediately, since the protective vapour phase is only effective in closed packaging. Bearings should be oiled or greased immediately after unpacking.

## Compatibility, miscibility

The anti-corrosion agents in bearings with an oil-based preservative are compatible and miscible with oils and greases having a mineral oil base. Compatibility should be checked if synthetic lubricants or thickeners other than lithium or lithium complex soaps are used. If there is an incompatibility, the anti-corrosion oil should be washed out before greasing, especially in the case of lubricants with a PTFE/alkoxyfluoroether base and thickeners based on polycarbamide. Bearings should be washed out if the lubricant is changed or the bearings are contaminated. If in doubt, please contact the relevant lubricant manufacturer.

## Cleaning of rolling bearings

The following are suitable for degreasing and washing of rolling bearings:

- aqueous neutral, acid or alkaline cleaning agents. Check the compatibility of alkaline agents with aluminium components before cleaning
- organic cleaning agents such as paraffin oil free from water and acid, petroleum ether (not petrol), spirit, dewatering fluids, freon 12 substitutes, cleaning agents containing chlorinated hydrocarbons.

Cleaning should be carried out using brushes, paint brushes or lint-free cloths. In the case of resinous oil or grease residues, precleaning by mechanical means followed by treatment with an aqueous, strongly alkaline cleaning agent is recommended.



Legal regulations relating to handling, environmental protection and health and safety at work must be complied with. The specifications of the cleaning agent manufacturer must be observed.

Paraffin oil, petroleum ether, spirit and dewatering fluids are flammable, alkaline agents are corrosive. The use of chlorinated hydrocarbons is associated with the risk of fire, explosion and decomposition as well as with health hazards.

These hazards and appropriate protective measures are described comprehensively in Datasheet ZH1/425 of the Hauptverband der gewerblichen Berufsgenossenschaften (German Federation of Institutions for Statutory Accident Insurance and Prevention).

After cleaning, rolling bearings must be dried and preservative applied immediately (risk of corrosion).



## Mounting

Comprehensive information on mounting and dismounting is given in the publications WL 80100, Mounting of Rolling Bearings and IS 1, Mounting and Maintenance of Rolling Bearings.

For more extensive work, a mounting manual should be available that precisely describes all relevant work.

The manual should also contain details on means of transport, mounting equipment, measurement tools, type and quantity of lubricant and a precise description of the mounting procedure.

## Guidelines for mounting



The following guidelines must always be taken into account:

- The assembly area must be kept clean and free from dust.
- Protect bearings from dust, contaminants and moisture. Contaminants have a detrimental influence on the running and operating life of rolling bearings.
- Before mounting work is started, familiarise yourself with the design by means of the final assembly drawing.
- Before mounting, check whether the bearing presented for mounting corresponds to the data in the drawing.
- Check the housing bore and shaft seat for dimensional and geometrical accuracy and cleanliness.
- Check that the shaft and housing bore have a lead chamfer of 10° to 15°.
- Wipe away any anti-corrosion agent from the seating and contact surfaces, wash anti-corrosion agent out of tapered bores.
- Lightly oil or rub solid lubricant into the bearing ring seating surfaces.
- Do not cool the bearings excessively. Moisture due to condensation can lead to corrosion in the bearings and bearing seats.
- After mounting, provide the rolling bearings with lubricant.
- Check the correct functioning of the bearing arrangement.

# Mounting and dismounting

## Mounting of rolling bearings with cylindrical seats



Avoid applying direct blows to the bearing rings with a hammer.

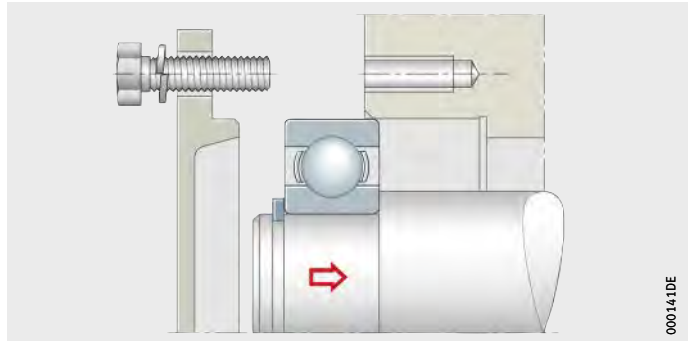
### Non-separable bearings

In non-separable bearings, apply the mounting forces to the ring with a tight fit, which should also be mounted first, *Figure 1*.

If the inner ring of a non-separable bearing will have a tight fit, press the bearing onto the shaft first, *Figure 1*. The bearing together with the shaft is then pushed into the housing (fit clearance).

Tight fit of the inner ring, mounting this ring first

*Figure 1*  
Non-separable bearing

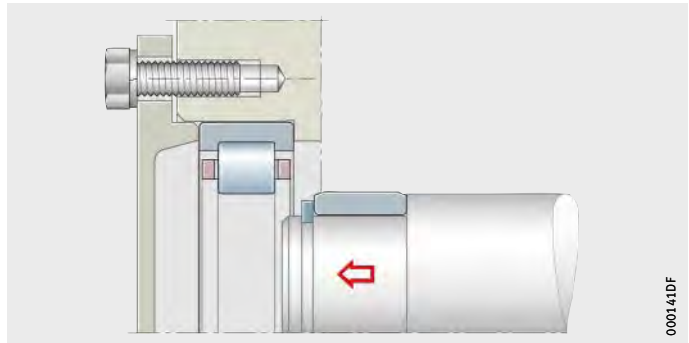


### Separable bearings

In separable bearings, mounting is easier; both rings can be mounted individually, *Figure 2*. Rotating the ring during mounting to give a screwdriver effect will help to avoid scraping marks.

Tight fit of the inner ring, individual mounting of rings

*Figure 2*  
Separable bearing

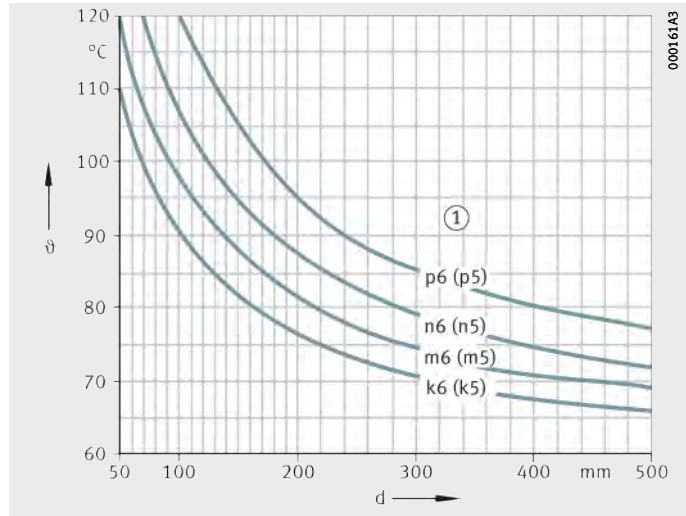




### Heating of bearings

Bearings with a cylindrical bore should be heated before mounting if a tight fit on the shaft is intended and excessive effort is required for pressing by mechanical means. The temperature required for mounting is shown in *Figure 3*. The data are valid for maximum fit interference, a room temperature of +20 °C and an excess temperature safety margin of 30 K.

$\vartheta$  = heating temperature  
d = bearing bore diameter  
① Shaft tolerance



*Figure 3*

Heating temperature

### Induction heating devices

Induction heating devices give rapid, safe and clean heating. The devices are used mainly in volume mounting work.

### Oil bath

With the exception of sealed, greased bearings and high precision bearings, rolling bearings of all sizes and types can be heated in an oil bath. A thermostatic controller is advisable (temperature +80 °C to +100 °C). In order that the bearings are heated uniformly, they should be laid on a grid or suspended in the oil bath.



With this method, please note the risk of accidents, environmental pollution by oil vapour, flammability of hot oil and risk of bearing contamination.

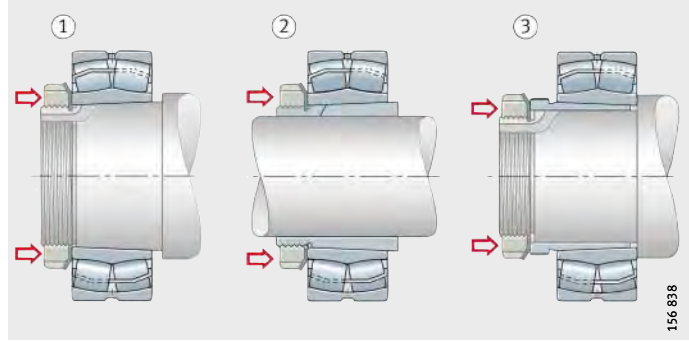
# Mounting and dismounting

## Mounting of rolling bearings with tapered bore

Bearings with a tapered bore are mounted either directly on the tapered shaft seat or by means of an adapter sleeve or withdrawal sleeve on a cylindrical shaft, *Figure 4* ①, ②, ③.

- ① Mounting using a locknut
- ② Mounting on an adapter sleeve using the adapter sleeve nut
- ③ Mounting on a withdrawal sleeve using a locknut

*Figure 4*  
Mounting of rolling bearings with a tapered bore



## Reduction in radial internal clearance

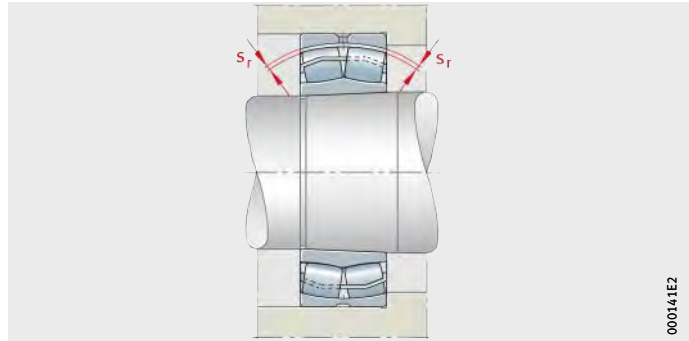
The reduction in radial internal clearance as a result of inner ring expansion is used as a means of checking the tight fit. In spherical roller bearings, the radial internal clearance ( $s_r$ ) must be measured simultaneously over both rows of rollers, *Figure 5*. Alternatively, the axial displacement is measured.

For values for the reduction in radial internal clearance and the displacement in spherical roller bearings, see section Spherical roller bearings, page 624 and page 625.

For the measurement of radial internal clearance, aids such as feeler gauges FEELER-GAUGE-100 and FEELER-GAUGE-300 are suitable.

Spherical roller bearings  
 $s_r$  = radial internal clearance

*Figure 5*  
Radial internal clearance





### Mounting using pressure screws or hydraulic tool

Even in the case of medium sized bearings, the forces required to tighten nuts are considerable. In such cases, mounting can be made easier by using locknuts with pressure screws, *Figure 6* ①. This method is not suitable for spherical roller bearings of E1 design.

For the mounting of large bearings, a hydraulic device should be used to drive up the product or press in the sleeve, *Figure 6* ②. Hydraulic nuts are available for all common threaded sleeves and shafts.

### Hydraulic method

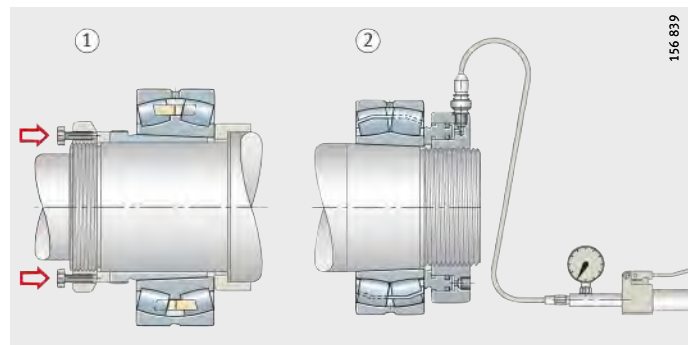
The hydraulic method gives considerable assistance in the mounting and particularly in the dismantling of bearings of approx.  $d = 160$  mm and above.

For mounting, an oil with a viscosity of  $75 \text{ mm}^2/\text{s}$  at  $+20 \text{ }^\circ\text{C}$  (nominal viscosity  $32 \text{ mm}^2/\text{s}$  at  $+40 \text{ }^\circ\text{C}$ ) is recommended.

- ① Mounting on withdrawal sleeve using locknut and pressure screws
- ② Mounting on tapered shaft using hydraulic nut

*Figure 6*

Mounting of rolling bearings with a tapered bore



### Guidelines for dismantling

Information on mounting and dismantling is given in the publications WL 80100, Mounting of Rolling Bearings and IS 1, Mounting and Maintenance of Rolling Bearings.

Dismounting should be taken into consideration in the original design of the bearing position. If bearing rings are to be mounted with a tight fit, slots should be provided in the shaft or housing bore, for example, to allow removal of the rings.



If the bearing is to be reused, the following guidelines should be taken into consideration:

- Do not use a concentrated or hard flame.
- Avoid direct blows on the bearing rings.
- Do not apply dismantling forces through the rolling elements.
- Clean the bearings carefully after dismantling.

## Mounting and dismounting

### Dismounting of rolling bearings on cylindrical seats

If the bearings and adjacent parts are to be reused, the removal tool should be applied to the ring mounted with a tight fit. In non-separable bearings, the ring mounted with a sliding fit is dismantled first and the ring with a tight fit is then removed.

### Removal of inner rings using an induction device

Induction heating devices are used to remove the shrink-mounted inner rings of cylindrical roller bearings, *Figure 7*.

Heating is achieved quickly and the rings are loosened easily without the transfer of substantial heat to the shaft.



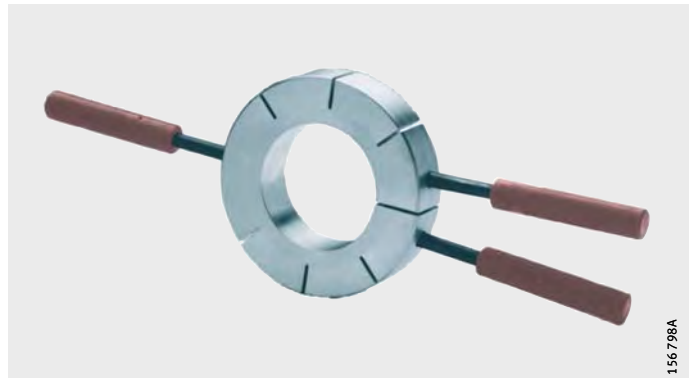
*Figure 7*  
Induction heating device

### Heating rings

Heating rings made from light metal with radial slots can be used to dismount the inner rings of cylindrical roller bearings that have no ribs or only one rigid rib, *Figure 8*. The rings are heated on an electric heating plate to between +200 °C and +300 °C, pushed over the bearing ring to be removed and clamped in place using the grips. Once the press fit on the shaft has been eliminated, both rings are removed together.



The bearing ring must be removed from the heating ring immediately after dismounting in order to prevent overheating.



*Figure 8*  
Heating ring





## Dismounting of rolling bearings with tapered bore

### Mechanical dismounting

Where bearings are mounted directly on a tapered shaft seat or on an adapter sleeve, the locking device on the shaft or adapter sleeve nut must be loosened first. The nut is then unscrewed by the amount of the displacement. The inner ring is then driven off the sleeve or shaft.

Dismounting of large bearings located using a withdrawal sleeve requires considerable force. In this case, locknuts with additional pressure screws can be used, *Figure 9*①. A disc must be inserted between the inner ring and the pressure screws.

### Hydraulic dismounting

An easier and more economical method is the dismounting of withdrawal sleeves using hydraulic nuts, *Figure 9*②. The protruding withdrawal sleeve is supported by a heavy-section ring.

The dismounting of large bearings can be made easier by using the hydraulic method, *Figure 9*③ and *Figure 10*. Oil is pressed between the fit surfaces. The adjacent parts can then be moved in relation to each other by applying only slight force and without the risk of surface damage.

Tapered shafts must be provided with appropriate oil slots and feed holes. Oil injectors are sufficient to generate the pressure. The arrangement of oil ducts in the hydraulic method for dismounting of a spherical roller bearing from a tapered shaft seat is shown in *Figure 10*.



The withdrawal sleeve becomes loose abruptly. Leave the nut on the shaft.

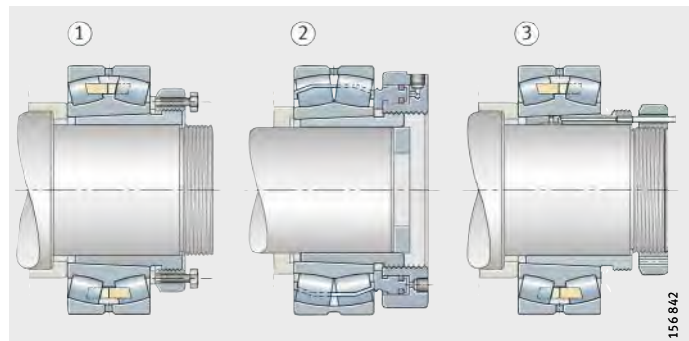
Large adapter and withdrawal sleeves already have the appropriate slots and holes. In this case, a pump must be used to generate the oil pressure required.

Dismounting of a withdrawal sleeve:

- ① Using a nut and pressure screws
- ② Using a hydraulic nut

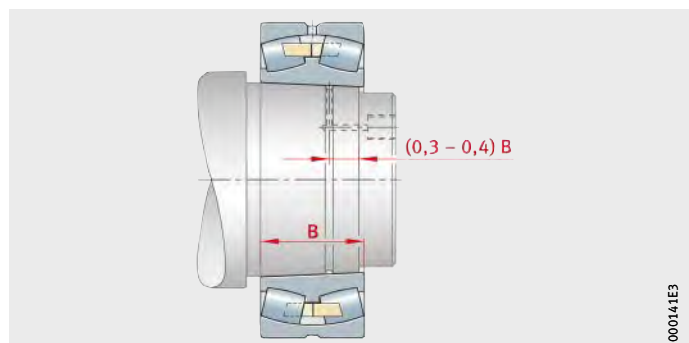
Dismounting of a spherical roller bearing from the withdrawal sleeve:

- ③ Using the hydraulic method



*Figure 9*

Dismounting of a withdrawal sleeve and spherical roller bearing



B = bearing width

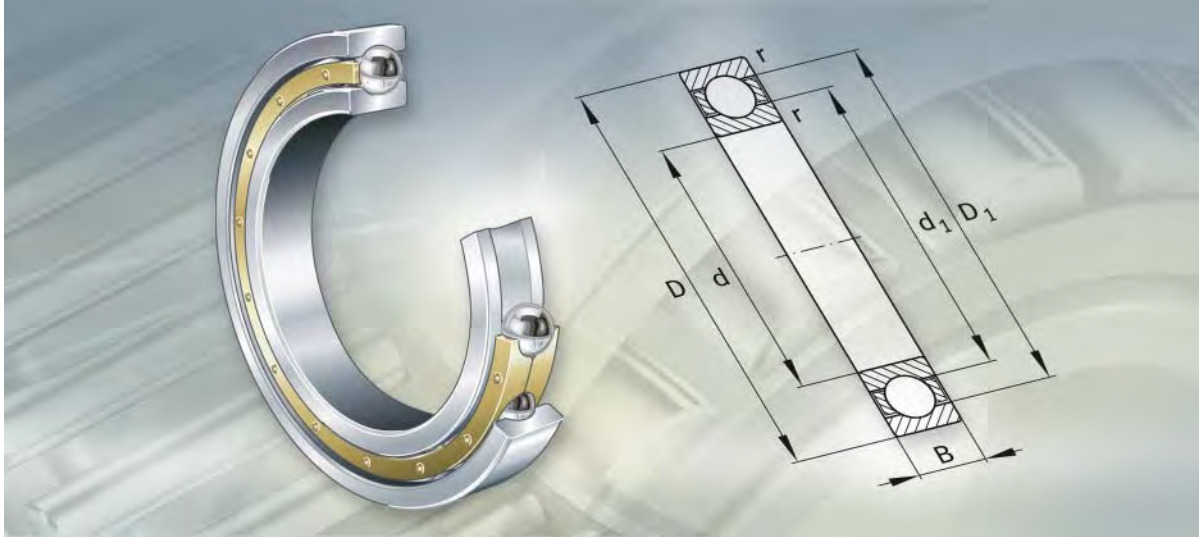
*Figure 10*

Oil ducts for dismounting a spherical roller bearing

## Mounting and dismounting

- Suitable oils** For dismounting, oils with a viscosity of approx. 150 mm<sup>2</sup>/s at +20 °C (nominal viscosity 46 mm<sup>2</sup>/s at +40 °C) are used. Fretting corrosion can be dissolved by rust-dissolving additives in the oil.
- Disposal of bearings after dismounting** If the bearings are not to be reused after dismounting, the products should be separated into their constituent parts. Grease, seals and plastic parts should be disposed of in accordance with the relevant waste product guidelines. Bearing rings and rolling elements should be sent for recycling.





# Deep groove ball bearings

Single row

# Deep groove ball bearings

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# Product overview Deep groove ball bearings

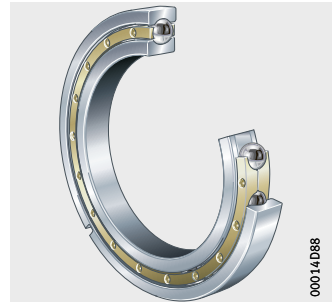
## Single row

With and without retaining slot

160, 60, 62, 63, 608, 618,  
609, 619, Z-5..KL1, F-8..KL1



Z-5..KL1-N1, F-8..KL1-N1



Hybrid deep groove ball bearings

F-HC8..KL1



# Deep groove ball bearings



**Features** Deep groove ball bearings are versatile, self-retaining bearings with solid outer rings, inner rings and ball and cage assemblies.

Single row deep groove ball bearings are of a simple design, robust in operation and easy to maintain.

Due to their low frictional torque, deep groove ball bearings are suitable for high speeds.

Deep groove ball bearings with standardised main dimensions and standardised designations (DIN 625-1) are used, for example, in gearboxes, electric motors, converter drive units and roll stands.

Deep groove ball bearings with non-standardised designations (Z-5..KL, F-8..KL) are used, for example, as axial bearings in roll stands.

Their section height is normally matched to the associated radial bearing.

Hybrid deep groove ball bearings with ceramic balls and steel bearing rings are special bearings for spreader rolls in paper machinery. These are indicated by the designation F-HC8..KL, see section Hybrid deep groove ball bearings, page 182.

## Radial and axial load carrying capacity

Due to the raceway geometry and the balls, deep groove ball bearings can support axial loads in both directions as well as radial loads, see section Axial load carrying capacity, page 185.

## Compensation of angular misalignments

The angular adjustment facility of single row deep groove ball bearings is limited, so the bearing positions must be well aligned. Misalignments can lead to unfavourable ball running and induce additional loads in the bearing that shorten the operating life.

In order to keep these loads at a low level, only small adjustment angles are permissible (dependent on the load) for single row deep groove ball bearings, see table.

## Load and adjustment angle for single row deep groove ball bearings

| Series               | Adjustment angle |            |
|----------------------|------------------|------------|
|                      | Low loads        | High loads |
| 62, 622, 63, 623, 64 | 5' – 10'         | 8' – 16'   |
| 618, 619, 160, 60    | 2' – 6'          | 5' – 10'   |

# Deep groove ball bearings

## Bearings with retaining slot

Deep groove ball bearings with a retaining slot in the outer ring can be easily secured in a circumferential direction. Special bearings that already have a retaining slot are indicated in the dimension table. By agreement, bearings with standardised main dimensions are also available with a retaining slot in the outer ring. These bearings have the suffix N1.

## Hybrid deep groove ball bearings

A special design of deep groove ball bearing is used in high speed spreader rolls in paper machinery. These hybrid bearings with the designation F-HC8..KL have steel bearing rings and ceramic balls. Since the number of balls is reduced in this case, the risk of slippage is significantly lower. Further information on these bearings is given in TPI WL 13-4, Hybrid Deep Groove Ball Bearings for Spreader Rolls.

## Matched single row deep groove ball bearings

By agreement, deep groove ball bearings of series 160, 60, 62, 63, 64 and 618 are available in different arrangements as matched pairs of bearings, *Figure 1*.

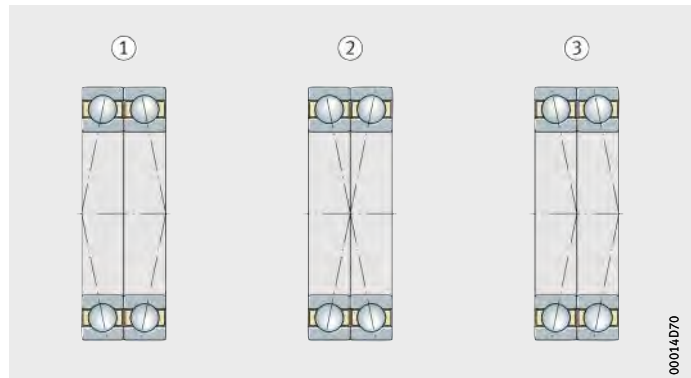
Sets in an O arrangement (suffix DB) can support axial loads in both directions as well as tilting moments.

Sets in an X arrangement (suffix DF) can support axial loads in both directions but are not suitable for tilting moments.

For high axial loads in one direction, pairs of bearings in a tandem arrangement are suitable (suffix DT).

- ① O arrangement, DB
- ② X arrangement, DF
- ③ Tandem arrangement, DT

*Figure 1*  
Matched sets







**Sealing** Single row deep groove ball bearings are not sealed.

**Lubrication** The bearings can be lubricated with grease or oil.

**Operating temperature** Deep groove ball bearings without seals can be used up to an operating temperature of +120 °C.  
For applications at temperatures above +120 °C, please contact us. Bearings with a diameter D of more than 240 mm are dimensionally stable up to +200 °C.

**Cages** Single row deep groove ball bearings without a cage suffix have a sheet steel cage.  
Deep groove ball bearings with ball-guided solid brass cages are indicated by the suffix M.  
The suffix MA indicates bearings with a solid brass cage guided on the outer ring.  
Cages guided on the inner ring are indicated by the suffix MB.

**Suffixes** Suffixes for available designs: see table.

**Available designs**

| Suffix <sup>1)</sup> | Description  | Design                                      |
|----------------------|--|---|
| C3                   | Radial internal clearance larger than normal                                 | Standard                                    |
| M                    | Solid brass cage, ball-guided  |   |
| MB                   | Solid brass cage, guided on inner ring                                       |   |
| DB                   | Two deep groove ball bearings in O arrangement, matched clearance-free       | Special design, available by agreement only |
| DF                   | Two deep groove ball bearings in X arrangement, matched clearance-free       |   |
| DT                   | Two deep groove ball bearings in tandem arrangement, matched clearance-free  |   |
| MA                   | Solid brass cage, guided on outer ring                                       |   |
| N1                   | One retaining slot in outer ring (for securing in circumferential direction) |   |
| P6                   | Tolerance class P6   |   |

<sup>1)</sup> In the case of deep groove ball bearings with non-standardised designations, the design (for example radial internal clearance, cage, accuracy) is specified in the designation (Z-5 or F-8).  
In the case of these bearings, additional suffixes are only used for deviations from the original design.

# Deep groove ball bearings

## Design and safety guidelines Equivalent dynamic bearing load

The equivalent dynamic load  $P$  is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

### Load ratio and equivalent dynamic load

| Load ratio               | Equivalent dynamic bearing load |
|--------------------------|---------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r$                       |
| $\frac{F_a}{F_r} > e$    | $P = X \cdot F_r + Y \cdot F_a$ |

$P$  kN  
Equivalent dynamic bearing load for combined load  
 $F_a$  kN  
Axial dynamic bearing load  
 $F_r$  kN  
Radial dynamic bearing load  
 $e, X, Y$  –  
Factors, see table Factors  $e, X$  and  $Y$ .

The factors  $e, X$  and  $Y$  required for determining  $P$  are dependent on the ratio  $f_0 \cdot F_a / C_{0r}$  and the radial internal clearance. The values in the table are valid for normal fits.

■ Shaft machined to j5 or k5, housing machined to J6.

### Factors $e, X$ and $Y$

| $\frac{f_0 \cdot F_a}{C_{0r}}$ | Factor for radial internal clearance |      |      |      |      |      |      |      |      |
|--------------------------------|--------------------------------------|------|------|------|------|------|------|------|------|
|                                | CN                                   |      |      | C3   |      |      | C4   |      |      |
|                                | $e$                                  | $X$  | $Y$  | $e$  | $X$  | $Y$  | $e$  | $X$  | $Y$  |
| 0,3                            | 0,22                                 | 0,56 | 2    | 0,32 | 0,46 | 1,7  | 0,4  | 0,44 | 1,4  |
| 0,5                            | 0,24                                 | 0,56 | 1,8  | 0,35 | 0,46 | 1,56 | 0,43 | 0,44 | 1,31 |
| 0,9                            | 0,28                                 | 0,56 | 1,58 | 0,39 | 0,46 | 1,41 | 0,45 | 0,44 | 1,23 |
| 1,6                            | 0,32                                 | 0,56 | 1,4  | 0,43 | 0,46 | 1,27 | 0,48 | 0,44 | 1,16 |
| 3                              | 0,36                                 | 0,56 | 1,2  | 0,48 | 0,46 | 1,14 | 0,52 | 0,44 | 1,08 |
| 6                              | 0,43                                 | 0,56 | 1    | 0,54 | 0,46 | 1    | 0,56 | 0,44 | 1    |

$C_{0r}$  kN  
Basic static load rating, see dimension tables  
 $f_0$  –  
Factor, see dimension tables  
 $F_a$  kN  
Axial dynamic bearing load.



## Equivalent static bearing load

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads.

It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

### Load ratio and equivalent static load

| Load ratio                       | Equivalent static load                      |
|----------------------------------|---|
| $\frac{F_{0a}}{F_{0r}} \leq 0,8$ | $P_0 = F_{0r}$                              |
| $\frac{F_{0a}}{F_{0r}} > 0,8$    | $P_0 = 0,6 \cdot F_{0r} + 0,5 \cdot F_{0a}$ |

$P_0$  kN  
Equivalent static bearing load for combined load

$F_{0a}$  kN  
Axial static bearing load

$F_{0r}$  kN  
Radial static bearing load.

## Axial load carrying capacity



Deep groove ball bearings are also suitable for axial loads.

If the bearing is subjected to high loads and high speeds, a reduced life as well as increased friction and bearing temperature must be taken into consideration.

## Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations.

In continuous operation, ball bearings with cage must be subjected to a minimum radial load of the order of  $P/C_r > 0,01$ .

## Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

## Mounting dimensions

The dimension tables give the maximum dimension of the radius  $r_a$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .

# Deep groove ball bearings

## Accuracy

The main dimensions of the standardised single row deep groove ball bearings correspond to DIN 625-1.

The dimensional and running tolerances of the standardised bearings correspond to tolerance class PN to DIN 620.

Tolerances for special bearings are available by agreement.

The width tolerance of matched bearings deviates from this standard, see table.

## Width tolerance of bearing rings in matched bearings

| Bore diameter<br>d<br>mm |       | Width deviation<br>$\Delta_{Bs}$<br>$\mu\text{m}$ |       |
|--------------------------|-------|---|-------|
| over                     | incl. | min.  | max.  |
| 120                      | 180   | 0   | -750  |
| 180                      | 250   | 0   | -950  |
| 250                      | 315   | 0   | -1050 |
| 315                      | 400   | 0   | -1350 |
| 400                      | 500   | 0   | -1650 |



## Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

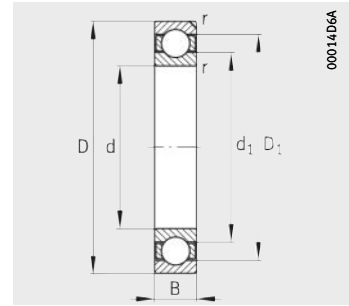
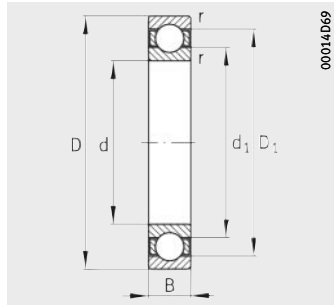
Standardised bearings with increased internal clearance have the suffix C3. Special bearings with radial internal clearance C3 or C4 are indicated in the dimension tables.

### Radial internal clearance

| Bore    |       | Radial internal clearance |      |          |      |          |      |          |       |
|---------|-------|---------------------------|------|----------|------|----------|------|----------|-------|
| d<br>mm |       | C2<br>μm                  |      | CN<br>μm |      | C3<br>μm |      | C4<br>μm |       |
| over    | incl. | min.                      | max. | min.     | max. | min.     | max. | min.     | max.  |
| 140     | 160   | 2                         | 23   | 18       | 53   | 46       | 91   | 81       | 130   |
| 160     | 180   | 2                         | 25   | 20       | 61   | 53       | 102  | 91       | 147   |
| 180     | 200   | 2                         | 30   | 25       | 71   | 63       | 117  | 107      | 163   |
| 200     | 225   | 2                         | 35   | 25       | 85   | 75       | 140  | 125      | 195   |
| 225     | 250   | 2                         | 40   | 30       | 95   | 85       | 160  | 145      | 225   |
| 250     | 280   | 2                         | 45   | 35       | 105  | 90       | 170  | 155      | 245   |
| 280     | 315   | 2                         | 55   | 40       | 115  | 100      | 190  | 175      | 270   |
| 315     | 355   | 3                         | 60   | 45       | 125  | 110      | 210  | 195      | 300   |
| 355     | 400   | 3                         | 70   | 55       | 145  | 130      | 240  | 225      | 340   |
| 400     | 450   | 3                         | 80   | 60       | 170  | 150      | 270  | 250      | 380   |
| 450     | 500   | 3                         | 90   | 70       | 190  | 170      | 300  | 280      | 420   |
| 500     | 560   | 10                        | 100  | 80       | 210  | 190      | 330  | 310      | 470   |
| 560     | 630   | 10                        | 110  | 90       | 230  | 210      | 360  | 340      | 520   |
| 630     | 710   | 20                        | 130  | 110      | 260  | 240      | 400  | 380      | 570   |
| 710     | 800   | 20                        | 140  | 120      | 290  | 270      | 450  | 430      | 630   |
| 800     | 900   | 20                        | 160  | 140      | 320  | 300      | 500  | 480      | 700   |
| 900     | 1 000 | 20                        | 170  | 150      | 350  | 330      | 550  | 530      | 770   |
| 1 000   | 1 120 | 20                        | 180  | 160      | 380  | 360      | 600  | 580      | 850   |
| 1 120   | 1 250 | 20                        | 190  | 170      | 410  | 390      | 650  | 630      | 920   |
| 1 250   | 1 400 | 30                        | 200  | 190      | 440  | 420      | 700  | 680      | 990   |
| 1 400   | 1 600 | 30                        | 210  | 210      | 470  | 450      | 750  | 730      | 1 060 |

# Deep groove ball bearings

Single row

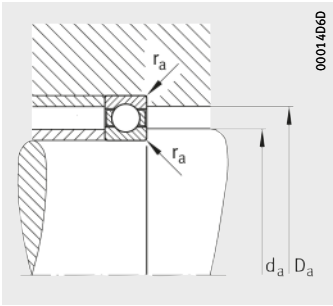


With retaining slot

**Dimension table** - Dimensions in mm

| Designation                     | Mass<br>m<br>≈kg | Dimensions |       |    |           |                     |                     |
|---------------------------------|------------------|------------|-------|----|-----------|---------------------|---------------------|
|                                 |                  | d          | D     | B  | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| <b>6330-M</b>                   | 26,5             | <b>150</b> | 320   | 65 | 4         | 266,1               | 205,6               |
| <b>6330-M-C3</b>                | 26,5             | <b>150</b> | 320   | 65 | 4         | 266,1               | 205,6               |
| <b>6332-M</b>                   | 31,6             | <b>160</b> | 340   | 68 | 4         | 280,9               | 219,7               |
| <b>6332-M-C3</b>                | 31,6             | <b>160</b> | 340   | 68 | 4         | 280,9               | 219,7               |
| <b>6334-M</b>                   | 37,3             | <b>170</b> | 360   | 72 | 4         | 298                 | 232,6               |
| <b>6334-M-C3</b>                | 37,3             | <b>170</b> | 360   | 72 | 4         | 298                 | 232,6               |
| <b>6236-M</b>                   | 19               | <b>180</b> | 320   | 52 | 4         | 272                 | 228,7               |
| <b>6236-M-C3</b>                | 19               | <b>180</b> | 320   | 52 | 4         | 272                 | 228,7               |
| <b>6336-M</b>                   | 43               | <b>180</b> | 380   | 75 | 4         | 317                 | 245,2               |
| <b>6336-M-C3</b>                | 43               | <b>180</b> | 380   | 75 | 4         | 317                 | 245,2               |
| <b>6238-M</b>                   | 22,6             | <b>190</b> | 340   | 55 | 4         | 291,5               | 239,9               |
| <b>6238-M-C3</b>                | 22,6             | <b>190</b> | 340   | 55 | 4         | 291,5               | 239,9               |
| <b>6338-M</b>                   | 50,4             | <b>190</b> | 400   | 78 | 5         | 330,5               | 260,2               |
| <b>6338-M-C3</b>                | 50,4             | <b>190</b> | 400   | 78 | 5         | 330,5               | 260,2               |
| <b>6240-M</b>                   | 27               | <b>200</b> | 360   | 58 | 4         | 306,5               | 254,9               |
| <b>6240-M-C3</b>                | 27               | <b>200</b> | 360   | 58 | 4         | 306,5               | 254,9               |
| <b>6340-M</b>                   | 56,6             | <b>200</b> | 420   | 80 | 5         | 345,9               | 274,7               |
| <b>6340-M-C3</b>                | 56,6             | <b>200</b> | 420   | 80 | 5         | 345,9               | 274,7               |
| <b>16044</b>                    | 11,8             | <b>220</b> | 340   | 37 | 2,1       | 298,1               | 262,8               |
| <b>6044-M</b>                   | 18,8             | <b>220</b> | 340   | 56 | 3         | 303,1               | 258,1               |
| <b>6044-M-C3</b>                | 18,8             | <b>220</b> | 340   | 56 | 3         | 303,1               | 258,1               |
| <b>6244-M</b>                   | 37,9             | <b>220</b> | 400   | 65 | 4         | 337,6               | 282,2               |
| <b>6244-M-C3</b>                | 37,9             | <b>220</b> | 400   | 65 | 4         | 337,6               | 282,2               |
| <b>6344-M</b>                   | 73,7             | <b>220</b> | 460   | 88 | 5         | 383                 | 299,4               |
| <b>6344-M-C3</b>                | 73,7             | <b>220</b> | 460   | 88 | 5         | 383                 | 299,4               |
| <b>F-801656.KL<sup>1)</sup></b> | 11,5             | <b>230</b> | 329,5 | 40 | 2,1       | 298,1               | 262,8               |
| <b>Z-508729.KL</b>              | 11,5             | <b>230</b> | 329,5 | 40 | 2,1       | 298,1               | 262,8               |
| <b>60948-M</b>                  | 6,19             | <b>240</b> | 320   | 25 | 1,5       | 292,3               | 268,3               |
| <b>61948</b>                    | 6,83             | <b>240</b> | 320   | 38 | 2,1       | 298                 | 262,9               |
| <b>61948-M-C3</b>               | 8,53             | <b>240</b> | 320   | 38 | 2,1       | 298                 | 262,9               |
| <b>61948-MA</b>                 | 8,48             | <b>240</b> | 320   | 38 | 2,1       | 298,9               | 262,9               |
| <b>Z-578545.KL</b>              | 10,4             | <b>240</b> | 329,5 | 40 | 2,1       | 303                 | 268                 |

<sup>1)</sup> With retaining slot.

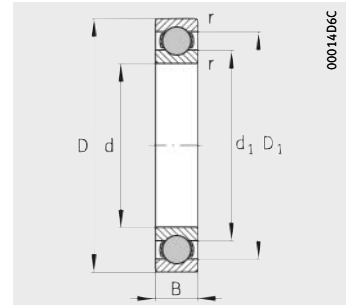
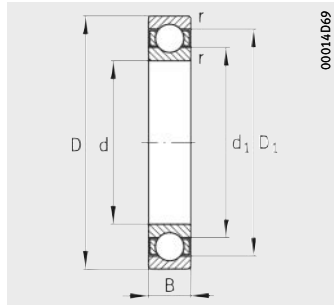


Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                   | Fatigue limit load<br>$C_{ur}$ | Factor<br>$f_0$ | Limiting speed<br>$n_G$ | Reference speed<br>$n_B$ |
|---------------------|-------|-------|--------------------|-------------------|--------------------------------|-----------------|-------------------------|--------------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ |                                |                 |                         |                          |
| min.                | max.  | max.  | kN                 | kN                | kN                             |                 | $\text{min}^{-1}$       | $\text{min}^{-1}$        |
| 167                 | 303   | 3     | 280                | 290               | 13,1                           | 13,8            | 4 800                   | 3 000                    |
| 167                 | 303   | 3     | 280                | 290               | 13,1                           | 13,8            | 4 800                   | 3 000                    |
| 177                 | 323   | 3     | 300                | 325               | 14                             | 13,9            | 4 300                   | 2 800                    |
| 177                 | 323   | 3     | 300                | 325               | 14                             | 13,9            | 4 300                   | 2 800                    |
| 187                 | 343   | 3     | 325                | 365               | 14,7                           | 13,9            | 4 000                   | 2 600                    |
| 187                 | 343   | 3     | 325                | 365               | 14,7                           | 13,9            | 4 000                   | 2 600                    |
| 197                 | 303   | 3     | 224                | 245               | 10,3                           | 15,3            | 4 800                   | 2 750                    |
| 197                 | 303   | 3     | 224                | 245               | 10,3                           | 15,3            | 4 800                   | 2 750                    |
| 197                 | 363   | 3     | 355                | 405               | 16,3                           | 13,9            | 3 800                   | 2 440                    |
| 197                 | 363   | 3     | 355                | 405               | 16,3                           | 13,9            | 3 800                   | 2 440                    |
| 207                 | 323   | 3     | 255                | 280               | 11,6                           | 15              | 4 300                   | 2 600                    |
| 207                 | 323   | 3     | 255                | 280               | 11,6                           | 15              | 4 300                   | 2 600                    |
| 210                 | 380   | 4     | 375                | 440               | 17,5                           | 14              | 3 600                   | 2 300                    |
| 210                 | 380   | 4     | 375                | 440               | 17,5                           | 14              | 3 600                   | 2 300                    |
| 217                 | 343   | 3     | 270                | 310               | 12,4                           | 15,3            | 4 000                   | 2 430                    |
| 217                 | 343   | 3     | 270                | 310               | 12,4                           | 15,3            | 4 000                   | 2 430                    |
| 220                 | 400   | 4     | 380                | 465               | 18                             | 14,1            | 3 400                   | 2 170                    |
| 220                 | 400   | 4     | 380                | 465               | 18                             | 14,1            | 3 400                   | 2 170                    |
| 230,2               | 329,8 | 2,1   | 200                | 240               | 8,4                            | 16,3            | 4 300                   | 2 310                    |
| 232,4               | 327,6 | 2,5   | 245                | 290               | 11,1                           | 15,6            | 4 000                   | 2 700                    |
| 232,4               | 327,6 | 2,5   | 245                | 290               | 11,1                           | 15,6            | 4 000                   | 2 700                    |
| 237                 | 383   | 3     | 300                | 355               | 13,5                           | 15,2            | 3 600                   | 2 200                    |
| 237                 | 383   | 3     | 300                | 355               | 13,5                           | 15,2            | 3 600                   | 2 200                    |
| 240                 | 440   | 4     | 440                | 560               | 20                             | 14,1            | 3 200                   | 1 960                    |
| 240                 | 440   | 4     | 440                | 560               | 20                             | 14,1            | 3 200                   | 1 960                    |
| 240                 | 319   | 2,1   | 200                | 240               | 8,4                            | 16,3            | 4 300                   | –                        |
| 240                 | 319   | 2,1   | 200                | 240               | 8,4                            | 16,3            | 4 300                   | –                        |
| 247                 | 313   | 1,5   | 108                | 146               | 5,1                            | 16              | 4 300                   | 2 000                    |
| 250,2               | 309,8 | 2,1   | 200                | 240               | 8,4                            | 16,3            | 4 300                   | 2 330                    |
| 250,2               | 309,8 | 2,1   | 200                | 240               | 8,4                            | 16,3            | 4 300                   | 2 330                    |
| 250,2               | 309,8 | 2,1   | 200                | 240               | 8,4                            | 16,3            | 4 300                   | 2 330                    |
| 250,2               | 319,3 | 2,1   | 196                | 240               | 8,7                            | 16,4            | 4 000                   | –                        |

# Deep groove ball bearings

Single row



Hybrid deep groove ball bearings with ceramic balls

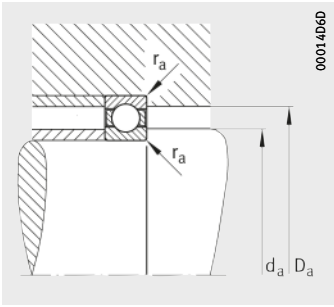
Dimension table (continued) · Dimensions in mm

| Designation                         | Mass<br>m<br>≈kg | Dimensions |       |     |           |                     |                     |
|-------------------------------------|------------------|------------|-------|-----|-----------|---------------------|---------------------|
|                                     |                  | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| <b>16048</b>                        | 12,7             | <b>240</b> | 360   | 37  | 2,1       | 317,4               | 283,1               |
| <b>6048-M</b>                       | 20,5             | <b>240</b> | 360   | 56  | 3         | 321,9               | 278,8               |
| <b>6048-M-C3</b>                    | 20,5             | <b>240</b> | 360   | 56  | 3         | 321,9               | 278,8               |
| <b>6248-M</b>                       | 51,3             | <b>240</b> | 440   | 72  | 4         | 369,6               | 309,9               |
| <b>6248-M-C3</b>                    | 51,3             | <b>240</b> | 440   | 72  | 4         | 369,6               | 309,9               |
| <b>6348-M</b>                       | 96,4             | <b>240</b> | 500   | 95  | 5         | 411,3               | 328,7               |
| <b>6348-M-C3</b>                    | 96,4             | <b>240</b> | 500   | 95  | 5         | 411,3               | 328,7               |
| <b>60852-M</b>                      | 2,17             | <b>260</b> | 320   | 19  | 1         | 298                 | 282                 |
| <b>F-HC808546.KL</b> <sup>1)</sup>  | 3,78             | <b>260</b> | 320   | 28  | 2         | 300,7               | 279,6               |
| <b>61852</b>                        | 4,23             | <b>260</b> | 320   | 28  | 2         | 300,7               | 279,6               |
| <b>61852-M</b>                      | 5,11             | <b>260</b> | 320   | 28  | 2         | 299,8               | 280,5               |
| <b>61852-MA</b>                     | 5,26             | <b>260</b> | 320   | 28  | 2         | 300,7               | 280,5               |
| <b>60952-M</b>                      | 10,5             | <b>260</b> | 360   | 31  | 2         | 324,3               | 296,2               |
| <b>61952-M</b>                      | 14,4             | <b>260</b> | 360   | 46  | 2,1       | 329,9               | 291,2               |
| <b>61952-M-C3</b>                   | 14,4             | <b>260</b> | 360   | 46  | 2,1       | 329,9               | 291,2               |
| <b>61952-MA</b>                     | 14,4             | <b>260</b> | 360   | 46  | 2,1       | 329,9               | 291,2               |
| <b>Z-507338.01.KL</b>               | 16,4             | <b>260</b> | 369,5 | 46  | 2,1       | 329,9               | 291,2               |
| <b>16052</b>                        | 19,1             | <b>260</b> | 400   | 44  | 3         | 351,2               | 310                 |
| <b>6052-M</b>                       | 29,8             | <b>260</b> | 400   | 65  | 4         | 357                 | 304,6               |
| <b>6052-M-C3</b>                    | 29,8             | <b>260</b> | 400   | 65  | 4         | 357                 | 304,6               |
| <b>6252-M</b>                       | 68,4             | <b>260</b> | 480   | 80  | 5         | 402,4               | 337,3               |
| <b>6252-M-C3</b>                    | 68,4             | <b>260</b> | 480   | 80  | 5         | 402,4               | 337,3               |
| <b>6352-M</b>                       | 118              | <b>260</b> | 540   | 102 | 6         | 446,1               | 355                 |
| <b>6352-M-C3</b>                    | 118              | <b>260</b> | 540   | 102 | 6         | 446,1               | 355                 |
| <b>60856-M</b>                      | 5,4              | <b>280</b> | 350   | 22  | 1,1       | 325,4               | 305,7               |
| <b>F-HC808547.KL</b> <sup>1)</sup>  | 5,63             | <b>280</b> | 350   | 33  | 2         | 328,1               | 302,7               |
| <b>F-804993.07.KL</b> <sup>2)</sup> | 5,89             | <b>280</b> | 350   | 33  | 2         | 328,1               | 302,7               |
| <b>F-808547.KL</b> <sup>2)</sup>    | 5,89             | <b>280</b> | 350   | 33  | 2         | 328,1               | 302,7               |
| <b>61856</b>                        | 6,34             | <b>280</b> | 350   | 33  | 2         | 328,1               | 302,7               |
| <b>61856-M</b>                      | 7,56             | <b>280</b> | 350   | 33  | 2         | 327,3               | 303,4               |
| <b>61856-MA</b>                     | 7,92             | <b>280</b> | 350   | 33  | 2         | 328,1               | 303,4               |

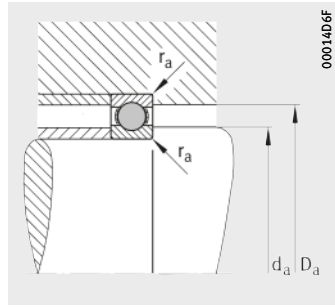
<sup>1)</sup> Hybrid deep groove ball bearing.

<sup>2)</sup> With JN cage.





Mounting dimensions



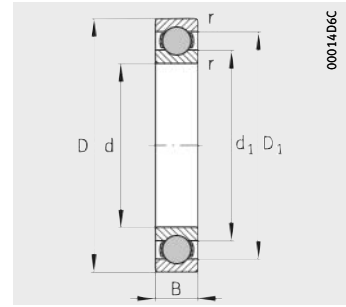
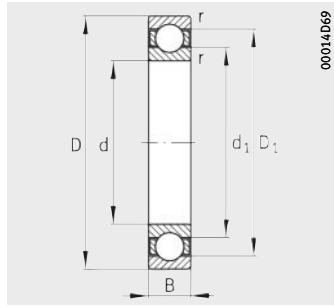
Mounting dimensions



| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$ | Factor<br>$f_0$ | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------|-----------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                |                 |  |   |
| 250,2               | 349,8         | 2,1           | 204                 | 255                     | 8,5                            | 16,4            | 3 800  | 2 100   |
| 252,4               | 347,6         | 2,5           | 255                 | 315                     | 11,4                           | 15,8            | 3 800  | 2 450   |
| 252,4               | 347,6         | 2,5           | 255                 | 315                     | 11,4                           | 15,8            | 3 800  | 2 450   |
| 257                 | 423           | 3             | 360                 | 475                     | 16,7                           | 15,2            | 3 400  | 1 980   |
| 257                 | 423           | 3             | 360                 | 475                     | 16,7                           | 15,2            | 3 400  | 1 980   |
| 260                 | 480           | 4             | 465                 | 620                     | 21,8                           | 14,2            | 3 000  | 1 800   |
| 260                 | 480           | 4             | 465                 | 620                     | 21,8                           | 14,2            | 3 000  | 1 800   |
| 264,6               | 315,4         | 1             | 67                  | 104                     | 3,6                            | 15,6            | 4 300  | 1 700   |
| 268,8               | 311,2         | 2             | 42,5                | 55                      | 1,61                           | 13,2            | 4 300  | –   |
| 268,8               | 311,2         | 2             | 96,5                | 132                     | 4,55                           | 15,8            | 4 300  | 2 070   |
| 268,8               | 311,2         | 2             | 96,5                | 132                     | 4,55                           | 15,8            | 4 300  | 2 070   |
| 268,8               | 311,2         | 2             | 96,5                | 132                     | 4,55                           | 15,8            | 4 300  | 2 070   |
| 268,8               | 351,2         | 2             | 153                 | 200                     | 6,4                            | 16,1            | 3 800  | 1 900   |
| 270,2               | 349,8         | 2,1           | 220                 | 280                     | 8,6                            | 16,3            | 3 800  | 2 180   |
| 270,2               | 349,8         | 2,1           | 220                 | 280                     | 8,6                            | 16,3            | 3 800  | 2 180   |
| 270,2               | 349,8         | 2,1           | 220                 | 280                     | 8,6                            | 16,3            | 3 800  | 2 180   |
| 270                 | 359,5         | 2,1           | 220                 | 280                     | 8,6                            | 16,3            | 3 800  | –   |
| 272,4               | 387,6         | 2,5           | 236                 | 310                     | 9,9                            | 16,4            | 3 600  | 1 960   |
| 274,6               | 385,4         | 3             | 300                 | 390                     | 13,3                           | 15,7            | 3 400  | 2 260   |
| 274,6               | 385,4         | 3             | 300                 | 390                     | 13,3                           | 15,7            | 3 400  | 2 260   |
| 280                 | 460           | 4             | 405                 | 560                     | 19,2                           | 15,2            | 3 000  | 1 820   |
| 280                 | 460           | 4             | 405                 | 560                     | 19,2                           | 15,2            | 3 000  | 1 820   |
| 265,6               | 534,4         | 5             | 520                 | 720                     | 24,8                           | 14,3            | 2 800  | 1 650   |
| 265,6               | 534,4         | 5             | 520                 | 720                     | 24,8                           | 14,3            | 2 800  | 1 650   |
| 286                 | 344           | 1             | 90                  | 134                     | 4,55                           | 15,7            | 4 000  | 1 600   |
| 288,8               | 341,2         | 2             | 60                  | 68                      | 2,05                           | 12,5            | 3 800  | –   |
| 288,8               | 341,2         | 2             | 81,5                | 88                      | –                              | 16              | 3 800  | –   |
| 288,8               | 341,2         | 2             | 81,5                | 88                      | 2,9                            | 16              | 3 800  | –   |
| 288,8               | 341,2         | 2             | 129                 | 176                     | 5,8                            | 16              | 3 800  | 1 950   |
| 288,8               | 341,2         | 2             | 129                 | 176                     | 5,8                            | 16              | 3 800  | –   |
| 288,8               | 341,2         | 2             | 129                 | 176                     | 5,8                            | 16              | 3 800  | –   |

# Deep groove ball bearings

Single row

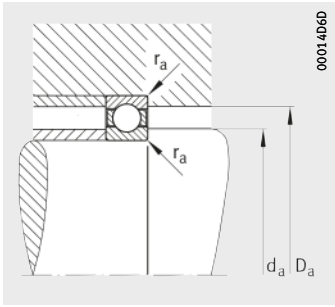


Hybrid deep groove ball bearings with ceramic balls

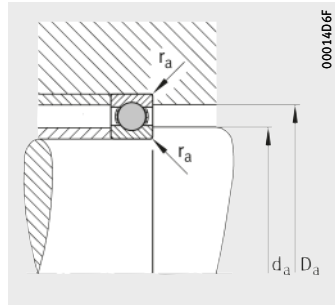
Dimension table (continued) · Dimensions in mm

| Designation                       | Mass<br>m<br>≈kg | Dimensions |       |     |           |                     |                     |
|-----------------------------------|------------------|------------|-------|-----|-----------|---------------------|---------------------|
|                                   |                  | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| <b>60956-M</b>                    | 11,2             | <b>280</b> | 380   | 31  | 2         | 344,3               | 316,2               |
| <b>61956</b>                      | 12,4             | <b>280</b> | 380   | 46  | 2,1       | 351,1               | 310,1               |
| <b>61956-M-C3</b>                 | 12,4             | <b>280</b> | 380   | 46  | 2,1       | 351,1               | 310,1               |
| <b>Z-507341.KL</b>                | 17,3             | <b>280</b> | 389,5 | 46  | 2,1       | 350,5               | 310,1               |
| <b>16056-M</b>                    | 23,2             | <b>280</b> | 420   | 44  | 3         | 370,6               | 329,9               |
| <b>6056-M</b>                     | 31,7             | <b>280</b> | 420   | 65  | 4         | 377,5               | 324,1               |
| <b>6056-M-C3</b>                  | 31,7             | <b>280</b> | 420   | 65  | 4         | 377,5               | 324,1               |
| <b>6256-M</b>                     | 72,9             | <b>280</b> | 500   | 80  | 5         | 423                 | 356,7               |
| <b>6256-M-C3</b>                  | 72,9             | <b>280</b> | 500   | 80  | 5         | 423                 | 356,7               |
| <b>6356-M</b>                     | 147              | <b>280</b> | 580   | 108 | 6         | 481,1               | 384                 |
| <b>6356-M-C3</b>                  | 147              | <b>280</b> | 580   | 108 | 6         | 481,1               | 384                 |
| <b>Z-578599.KL</b>                | 26,2             | <b>290</b> | 409,5 | 60  | 3         | 375                 | 325,6               |
| <b>60860-M</b>                    | 7,55             | <b>300</b> | 380   | 25  | 1,5       | 351,3               | 329,3               |
| <b>F-HC808548.KL<sup>1)</sup></b> | 8,03             | <b>300</b> | 380   | 38  | 2,1       | 354,7               | 326,2               |
| <b>61860</b>                      | 8,97             | <b>300</b> | 380   | 38  | 2,1       | 354,7               | 326,2               |
| <b>61860-M</b>                    | 10,7             | <b>300</b> | 380   | 38  | 2,1       | 353,8               | 327                 |
| <b>Z-538205.KL</b>                | 24,4             | <b>300</b> | 419,5 | 56  | 3         | 383                 | 337,1               |
| <b>60960-M</b>                    | 17,6             | <b>300</b> | 420   | 37  | 2,1       | 376,6               | 344,3               |
| <b>61960-M</b>                    | 24               | <b>300</b> | 420   | 56  | 3         | 384,2               | 337,1               |
| <b>61960-M-C3</b>                 | 24               | <b>300</b> | 420   | 56  | 3         | 384,2               | 337,1               |
| <b>61960-MA</b>                   | 26,2             | <b>300</b> | 420   | 56  | 3         | 385,1               | 337,1               |
| <b>61960-MB</b>                   | 25,9             | <b>300</b> | 420   | 56  | 3         | 384,2               | 336,4               |
| <b>16060-M</b>                    | 32,6             | <b>300</b> | 460   | 50  | 4         | 404                 | 357,3               |
| <b>6060-M</b>                     | 44,5             | <b>300</b> | 460   | 74  | 4         | 410,8               | 350,8               |
| <b>6060-M-C3</b>                  | 44,5             | <b>300</b> | 460   | 74  | 4         | 410,8               | 350,8               |
| <b>6060-MB-C3</b>                 | 44,5             | <b>300</b> | 460   | 74  | 4         | 410,8               | 350,8               |
| <b>6260-M</b>                     | 90,5             | <b>300</b> | 540   | 85  | 5         | 456,1               | 383,3               |
| <b>6260-M-C3</b>                  | 90,5             | <b>300</b> | 540   | 85  | 5         | 456,1               | 383,3               |
| <b>6360-M</b>                     | 170              | <b>300</b> | 620   | 109 | 7,5       | 511,8               | 410,5               |
| <b>6360-M-C3</b>                  | 170              | <b>300</b> | 620   | 109 | 7,5       | 511,8               | 410,5               |

<sup>1)</sup> Hybrid deep groove ball bearing.



Mounting dimensions



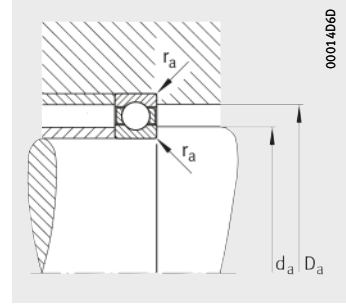
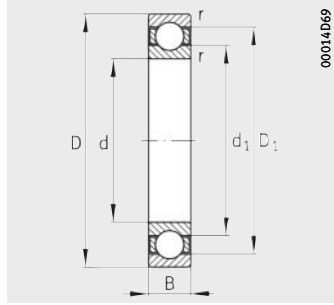
Mounting dimensions



| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$ | Factor<br>$f_0$ | Limiting speed<br>$n_G$ | Reference speed<br>$n_B$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------|-----------------|-------------------------|--------------------------|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                |                 |                         |                          |
| 288,8               | 371,2         | 2             | 156                 | 216                     | 6,9                            | 16              | 3 600                   | 1 700                    |
| 290,2               | 369,8         | 2,1           | 236                 | 310                     | 9,9                            | 16,4            | 3 600                   | 1 990                    |
| 290,2               | 369,8         | 2,1           | 236                 | 310                     | 9,9                            | 16,4            | 3 600                   | 1 990                    |
| 290                 | 379,5         | 2,1           | 236                 | 310                     | 9,4                            | 16,4            | 3 600                   | –                        |
| 292,4               | 407,6         | 2,5           | 240                 | 325                     | 10,1                           | 16,4            | 3 400                   | 1 800                    |
| 294,6               | 405,4         | 3             | 320                 | 440                     | 14,4                           | 15,8            | 3 400                   | 2 070                    |
| 294,6               | 405,4         | 3             | 320                 | 440                     | 14,4                           | 15,8            | 3 400                   | 2 070                    |
| 291                 | 489           | 4             | 425                 | 600                     | 20,3                           | 15,3            | 3 000                   | 1 690                    |
| 291                 | 489           | 4             | 425                 | 600                     | 20,3                           | 15,3            | 3 000                   | 1 690                    |
| 285,6               | 574,4         | 5             | 610                 | 915                     | 26                             | 14,3            | 2 600                   | 1 470                    |
| 285,6               | 574,4         | 5             | 610                 | 915                     | 26                             | 14,3            | 2 600                   | 1 470                    |
| 302,4               | 397,1         | 2,5           | 310                 | 425                     | 13,8                           | 15,9            | 3 400                   | –                        |
| 307                 | 373           | 1,5           | 112                 | 166                     | 5,5                            | 15,7            | 3 600                   | 1 500                    |
| 310,2               | 369,8         | 2,1           | 71                  | 80                      | 2,22                           | 12,5            | 3 600                   | –                        |
| 310,2               | 369,8         | 2,1           | 153                 | 204                     | 6,3                            | 16              | 3 600                   | 1 850                    |
| 310,2               | 369,8         | 2,1           | 153                 | 204                     | 6,3                            | 16              | 3 600                   | –                        |
| 312,4               | 407,1         | 2,5           | 285                 | 400                     | 11,6                           | 16,2            | 3 200                   | –                        |
| 310,2               | 409,8         | 2,1           | 204                 | 275                     | 8,5                            | 16,2            | 3 400                   | 1 600                    |
| 312,4               | 407,6         | 2,5           | 285                 | 400                     | 12,4                           | 16,2            | 3 200                   | 1 890                    |
| 312,4               | 407,6         | 2,5           | 285                 | 400                     | 12,4                           | 16,2            | 3 200                   | 1 890                    |
| 312,4               | 407,6         | 2,5           | 285                 | 400                     | 12,4                           | 16,2            | 3 200                   | 1 890                    |
| 312,4               | 407,6         | 2,5           | 285                 | 400                     | 12,4                           | 16,2            | 3 200                   | 1 890                    |
| 314,6               | 445,4         | 3             | 300                 | 430                     | 12,7                           | 16,4            | 3 200                   | 1 670                    |
| 314,6               | 445,4         | 3             | 365                 | 510                     | 16,7                           | 15,7            | 3 000                   | 1 930                    |
| 314,6               | 445,4         | 3             | 365                 | 510                     | 16,7                           | 15,7            | 3 000                   | 1 930                    |
| 314,6               | 445,4         | 3             | 365                 | 510                     | 16,7                           | 15,7            | 3 000                   | 1 930                    |
| 320                 | 520           | 4             | 455                 | 670                     | 19,7                           | 15,3            | 2 800                   | 1 550                    |
| 320                 | 520           | 4             | 455                 | 670                     | 19,7                           | 15,3            | 2 800                   | 1 550                    |
| 332                 | 588           | 6             | 640                 | 980                     | 31                             | 14,4            | 2 400                   | 1 360                    |
| 332                 | 588           | 6             | 640                 | 980                     | 31                             | 14,4            | 2 400                   | 1 360                    |

# Deep groove ball bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

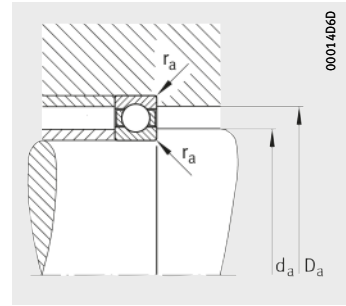
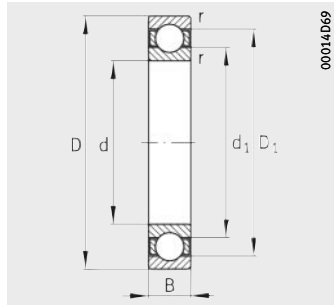
| Designation    | Mass<br>m<br>≈kg | Dimensions |       |     |           |                     |                     |
|----------------|------------------|------------|-------|-----|-----------|---------------------|---------------------|
|                |                  | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| 60864-M        | 7,98             | 320        | 400   | 25  | 1,5       | 371,5               | 349,2               |
| 61864-M        | 11,3             | 320        | 400   | 38  | 2,1       | 373,8               | 347                 |
| 60964-M        | 18,5             | 320        | 440   | 37  | 2,1       | 395,7               | 364                 |
| 61964-M        | 25,3             | 320        | 440   | 56  | 3         | 403,9               | 357,3               |
| 61964-M-C3     | 25,3             | 320        | 440   | 56  | 3         | 403,9               | 357,3               |
| 61964-MA       | 25               | 320        | 440   | 56  | 3         | 405,1               | 357,3               |
| F-807088.KL    | 27,6             | 320        | 449,5 | 56  | 3         | 403,9               | 356,4               |
| 16064-M        | 34,9             | 320        | 480   | 50  | 4         | 423,1               | 377,7               |
| 6064-M         | 47,4             | 320        | 480   | 74  | 4         | 430,8               | 370,9               |
| 6064-M-C3      | 47,4             | 320        | 480   | 74  | 4         | 430,8               | 370,9               |
| 6064-MB-C3     | 47,4             | 320        | 480   | 74  | 4         | 430,8               | 370,9               |
| 6264-M         | 113              | 320        | 580   | 92  | 5         | 492,5               | 410                 |
| 6264-M-C3      | 113              | 320        | 580   | 92  | 5         | 492,5               | 410                 |
| Z-507360.01.KL | 126              | 320        | 580   | 105 | 5         | 491,5               | 410,8               |
| 6364-M         | 205              | 320        | 670   | 112 | 7,5       | 546,8               | 446,3               |
| 6364-M-C3      | 205              | 320        | 670   | 112 | 7,5       | 546,8               | 446,3               |
| Z-509173.KL    | 29,6             | 330        | 460   | 56  | 3         | 423,1               | 377,9               |
| 60868-M        | 8,22             | 340        | 420   | 25  | 1,5       | 391,3               | 369,3               |
| 61868-M        | 12               | 340        | 420   | 38  | 2,1       | 394,2               | 366,7               |
| 61868-MA       | 12               | 340        | 420   | 38  | 2,1       | 394,2               | 366,7               |
| 60968-M        | 19,8             | 340        | 460   | 37  | 2,1       | 417                 | 384                 |
| 61968-M        | 27,3             | 340        | 460   | 56  | 3         | 423,1               | 377,8               |
| 61968-MA       | 27               | 340        | 460   | 56  | 3         | 424                 | 377,8               |
| 61968-MB-C3    | 27,3             | 340        | 460   | 56  | 3         | 423,1               | 377,8               |
| Z-538204.KL    | 35,4             | 340        | 479,5 | 60  | 3         | 431,1               | 388                 |
| Z-503809.KL    | 35,5             | 340        | 480   | 60  | 3         | 432                 | 388                 |
| Z-576368.KL    | 40,9             | 340        | 489,5 | 65  | 5         | 442                 | 388,6               |
| 16068-M        | 47,5             | 340        | 520   | 57  | 4         | 457,1               | 403,6               |
| 6068-M         | 63,2             | 340        | 520   | 82  | 5         | 469,6               | 402,3               |
| 6068-M-C3      | 63,2             | 340        | 520   | 82  | 5         | 469,6               | 402,3               |
| 6068-MB-C3     | 63,2             | 340        | 520   | 82  | 5         | 469,6               | 402,3               |
| 6268-M         | 118              | 340        | 620   | 92  | 6         | 530                 | 446,5               |
| 6268-M-C3      | 118              | 340        | 620   | 92  | 6         | 530                 | 446,5               |
| 6368-M         | 244              | 340        | 710   | 118 | 7,5       | 578                 | 474                 |
| 6368-M-C3      | 244              | 340        | 710   | 118 | 7,5       | 578                 | 474                 |
| Z-532002.KL    | 44,3             | 350        | 500   | 70  | 4         | 457,1               | 402,7               |



| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Factor<br>$f_0$ | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-----------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |                 |  |   |
| 327                 | 393           | 1,5           | 114                 | 176                     | 5,2                                  | 15,7            | 3 400  | 1 400   |
| 330,2               | 389,8         | 2,1           | 156                 | 220                     | 6,5                                  | 15,9            | 3 400  | 1 710   |
| 330,2               | 429,8         | 2,1           | 204                 | 285                     | 8,6                                  | 16,1            | 3 200  | 1 500   |
| 332,4               | 427,6         | 2,5           | 300                 | 430                     | 12,7                                 | 16,4            | 3 200  | 1 750   |
| 332,4               | 427,6         | 2,5           | 300                 | 430                     | 12,7                                 | 16,4            | 3 200  | 1 750   |
| 332,4               | 427,6         | 2,5           | 300                 | 430                     | 12,7                                 | 16,4            | 3 200  | 1 750   |
| 332,4               | 437,1         | 2,5           | 300                 | 430                     | 12,7                                 | 16,4            | 3 200  | –   |
| 334,6               | 465,4         | 3             | 305                 | 455                     | 13                                   | 16,4            | 3 000  | 1 550   |
| 334,6               | 465,4         | 3             | 380                 | 560                     | 17,4                                 | 15,9            | 3 000  | 1 790   |
| 334,6               | 465,4         | 3             | 380                 | 560                     | 17,4                                 | 15,9            | 3 000  | 1 790   |
| 334,6               | 465,4         | 3             | 380                 | 560                     | 17,4                                 | 15,9            | 3 000  | 1 790   |
| 340                 | 560           | 4             | 530                 | 815                     | 23,5                                 | 15,2            | 2 600  | 1 430   |
| 340                 | 560           | 4             | 530                 | 815                     | 23,5                                 | 15,2            | 2 600  | 1 430   |
| 340                 | 560           | 4             | 530                 | 815                     | 23,5                                 | 15,2            | 2 600  | –   |
| 325,6               | 664,4         | 6             | 630                 | 1 000                   | 30,5                                 | 14,8            | 2 200  | 1 250   |
| 325,6               | 664,4         | 6             | 630                 | 1 000                   | 30,5                                 | 14,8            | 2 200  | 1 250   |
| 352,4               | 447,6         | 2,5           | 305                 | 455                     | 13                                   | 16,4            | 3 000  | –   |
| 347                 | 413           | 1,5           | 118                 | 186                     | 5,8                                  | 15,6            | 3 400  | 1 300   |
| 350,2               | 409,8         | 2,1           | 156                 | 220                     | 6,6                                  | 15,9            | 3 200  | 1 590   |
| 350,2               | 409,8         | 2,1           | 156                 | 220                     | 6,6                                  | 15,9            | 3 200  | 1 590   |
| 350,2               | 449,8         | 2,1           | 208                 | 300                     | 8,8                                  | 16              | 3 000  | 1 400   |
| 352,4               | 447,6         | 2,5           | 305                 | 455                     | 13                                   | 16,4            | 3 000  | 1 630   |
| 352,4               | 447,6         | 2,5           | 305                 | 455                     | 13                                   | 16,4            | 3 000  | 1 630   |
| 352,4               | 447,6         | 2,5           | 305                 | 455                     | 13                                   | 16,4            | 3 000  | 1 630   |
| 352,4               | 467,4         | 2,5           | 280                 | 415                     | 11,9                                 | 16,5            | 3 000  | –   |
| 352,4               | 467,6         | 2,5           | 280                 | 415                     | 11,9                                 | 16,5            | 3 000  | –   |
| 358                 | 471,5         | 4             | 345                 | 510                     | 13,9                                 | 16,2            | 2 800  | –   |
| 354,6               | 505,4         | 3             | 355                 | 550                     | 17,8                                 | 16,3            | 2 800  | 1 460   |
| 358                 | 502           | 4             | 440                 | 695                     | 20,8                                 | 15,8            | 2 800  | 1 630   |
| 358                 | 502           | 4             | 440                 | 695                     | 20,8                                 | 15,8            | 2 800  | 1 630   |
| 358                 | 502           | 4             | 440                 | 695                     | 20,8                                 | 15,8            | 2 800  | 1 630   |
| 366                 | 594           | 5             | 550                 | 900                     | 26                                   | 15,5            | 2 400  | 1 270   |
| 366                 | 594           | 5             | 550                 | 900                     | 26                                   | 15,5            | 2 400  | 1 270   |
| 345,6               | 704,4         | 6             | 710                 | 1 180                   | 35                                   | 14,9            | 2 000  | 1 160   |
| 345,6               | 704,4         | 6             | 710                 | 1 180                   | 35                                   | 14,9            | 2 000  | 1 160   |
| 365                 | 485           | 3             | 355                 | 550                     | 15,3                                 | 16,3            | 2 800  | –   |

# Deep groove ball bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

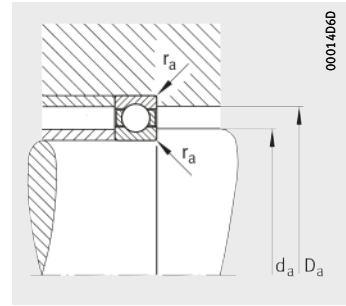
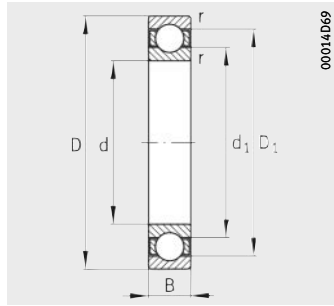
| Designation | Mass<br>m<br>≈kg | Dimensions |       |     |           |                     |                     |
|-------------|------------------|------------|-------|-----|-----------|---------------------|---------------------|
|             |                  | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| 60872-M     | 8,87             | 360        | 440   | 25  | 1,5       | 411,5               | 389,2               |
| 61872-M     | 12,8             | 360        | 440   | 38  | 2,1       | 413                 | 387,7               |
| 61872-MA    | 12,8             | 360        | 440   | 38  | 2,1       | 414,2               | 387,7               |
| 61872-MB    | 12,8             | 360        | 440   | 38  | 2,1       | 413                 | 386,7               |
| F-804093.KL | 27,9             | 360        | 479   | 56  | 3         | 442,8               | 397                 |
| 60972-M     | 20,4             | 360        | 480   | 37  | 2,1       | 437                 | 404                 |
| 61972-M     | 28,7             | 360        | 480   | 56  | 3         | 442,8               | 398                 |
| 61972-MA    | 30,6             | 360        | 480   | 56  | 3         | 444                 | 398                 |
| 61972-MB    | 28,2             | 360        | 480   | 56  | 3         | 442,8               | 397                 |
| 61972-MB-C3 | 28,2             | 360        | 480   | 56  | 3         | 442,8               | 397                 |
| 16072-M     | 49,4             | 360        | 540   | 57  | 4         | 478,1               | 423,5               |
| 6072-M      | 66,2             | 360        | 540   | 82  | 5         | 489                 | 423,7               |
| 6072-M-C3   | 66,2             | 360        | 540   | 82  | 5         | 489                 | 423,7               |
| 6072-MB-C3  | 66,2             | 360        | 540   | 82  | 5         | 489                 | 423,7               |
| Z-533303.KL | 76,8             | 360        | 550   | 85  | 5         | 490,3               | 423,7               |
| 6272-M      | 148              | 360        | 650   | 95  | 6         | 549                 | 462,7               |
| 6272-M-C3   | 148              | 360        | 650   | 95  | 6         | 549                 | 462,7               |
| 6372-M      | 293              | 360        | 750   | 125 | 7,5       | 611                 | 499                 |
| 6372-M-C3   | 293              | 360        | 750   | 125 | 7,5       | 611                 | 499                 |
| 60876-M     | 14,2             | 380        | 480   | 31  | 2         | 444,1               | 416,7               |
| 61876-M     | 20,6             | 380        | 480   | 46  | 2,1       | 445,9               | 414,1               |
| Z-576367.KL | 40,3             | 380        | 519,5 | 65  | 4         | 478,2               | 423,7               |
| 60976-M     | 30,3             | 380        | 520   | 44  | 3         | 469,4               | 431,3               |
| 61976-M     | 40,6             | 380        | 520   | 65  | 4         | 478                 | 423,5               |
| 61976-MA    | 41,9             | 380        | 520   | 65  | 4         | 479,3               | 423,5               |
| 61976-MB    | 41,4             | 380        | 520   | 65  | 4         | 478                 | 422,5               |
| 61976-MB-C3 | 41,4             | 380        | 520   | 65  | 4         | 478                 | 422,5               |
| 16076-M     | 51,7             | 380        | 560   | 57  | 4         | 498                 | 443,5               |
| 6076-M      | 69,6             | 380        | 560   | 82  | 5         | 504                 | 438,6               |
| 6076-M-C3   | 69,6             | 380        | 560   | 82  | 5         | 504                 | 438,6               |
| 6076-MB-C3  | 69,6             | 380        | 560   | 82  | 5         | 504                 | 438,6               |
| 6276-M      | 161              | 380        | 680   | 95  | 6         | 574                 | 487,7               |
| 6276-M-C3   | 161              | 380        | 680   | 95  | 6         | 574                 | 487,7               |
| 6376-M      | 317              | 380        | 780   | 128 | 7,5       | 640                 | 523,5               |
| 6376-M-C3   | 317              | 380        | 780   | 128 | 7,5       | 640                 | 523,5               |



| Mounting dimensions |       |       | Basic load ratings |                   | Fatigue limit load<br>$C_{ur}$ | Factor<br>$f_0$ | Limiting speed<br>$n_G$ | Reference speed<br>$n_B$ |
|---------------------|-------|-------|--------------------|-------------------|--------------------------------|-----------------|-------------------------|--------------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ |                                |                 |                         |                          |
| min.                | max.  | max.  | kN                 | kN                | kN                             |                 | $\text{min}^{-1}$       | $\text{min}^{-1}$        |
| 367                 | 433   | 1,5   | 120                | 196               | 5,5                            | 15,6            | 3 200                   | 1 200                    |
| 370,2               | 429,8 | 2,1   | 160                | 236               | 6,9                            | 15,8            | 3 200                   | 1 480                    |
| 370,2               | 429,8 | 2,1   | 160                | 236               | 6,9                            | 15,8            | 3 200                   | 1 480                    |
| 370,2               | 429,8 | 2,1   | 160                | 236               | 6,9                            | 15,8            | 3 200                   | 1 480                    |
| 372,4               | 467,6 | 2,5   | 310                | 480               | 13,3                           | 16,5            | 3 000                   | 1 500                    |
| 370,2               | 469,8 | 2,1   | 208                | 305               | 8,9                            | 15,9            | 3 000                   | 1 300                    |
| 372,4               | 467,6 | 2,5   | 310                | 480               | 13,2                           | 16,5            | 3 000                   | 1 520                    |
| 372,4               | 467,6 | 2,5   | 310                | 480               | 13,2                           | 16,5            | 3 000                   | 1 520                    |
| 372,4               | 467,6 | 2,5   | 310                | 480               | 13,2                           | 16,5            | 3 000                   | 1 520                    |
| 372,4               | 467,6 | 2,5   | 310                | 480               | 13,2                           | 16,5            | 3 000                   | 1 520                    |
| 374,6               | 525,4 | 3     | 365                | 585               | 15,7                           | 16,4            | 2 800                   | 1 370                    |
| 378                 | 522   | 4     | 455                | 735               | 21,5                           | 15,9            | 2 600                   | 1 530                    |
| 378                 | 522   | 4     | 455                | 735               | 21,5                           | 15,9            | 2 600                   | 1 530                    |
| 378                 | 522   | 4     | 455                | 735               | 21,5                           | 15,9            | 2 600                   | 1 530                    |
| 378                 | 532   | 4     | 455                | 735               | 21,5                           | 15,9            | 2 600                   | –                        |
| 362,4               | 647,6 | 5     | 560                | 900               | 25,5                           | 15,4            | 2 200                   | 1 240                    |
| 362,4               | 647,6 | 5     | 560                | 900               | 25,5                           | 15,4            | 2 200                   | 1 240                    |
| 365,6               | 744,4 | 6     | 735                | 1 250             | 35                             | 14,8            | 1 900                   | 1 100                    |
| 365,6               | 744,4 | 6     | 735                | 1 250             | 35                             | 14,8            | 1 900                   | 1 100                    |
| 388,8               | 471,2 | 2     | 166                | 260               | 7,2                            | 15,7            | 3 000                   | 1 200                    |
| 390,2               | 469,8 | 2,1   | 220                | 320               | 8,9                            | 16              | 3 000                   | 1 430                    |
| 394,6               | 505,4 | 3     | 365                | 585               | 15,1                           | 16,4            | 2 800                   | –                        |
| 392,4               | 507,6 | 2,5   | 250                | 390               | 11,2                           | 16              | 2 800                   | 1 300                    |
| 394,6               | 505,4 | 3     | 365                | 585               | 15,1                           | 16,4            | 2 800                   | 1 450                    |
| 394,6               | 505,4 | 3     | 365                | 585               | 15,1                           | 16,4            | 2 800                   | 1 450                    |
| 394,6               | 505,4 | 3     | 365                | 585               | 15,1                           | 16,4            | 2 800                   | 1 450                    |
| 394,6               | 505,4 | 3     | 365                | 585               | 15,1                           | 16,4            | 2 800                   | 1 450                    |
| 394,6               | 545,4 | 3     | 375                | 620               | 16,1                           | 16,5            | 2 600                   | 1 290                    |
| 398                 | 542   | 4     | 455                | 750               | 21,1                           | 16              | 2 600                   | 1 470                    |
| 398                 | 542   | 4     | 455                | 750               | 21,1                           | 16              | 2 600                   | 1 470                    |
| 398                 | 542   | 4     | 455                | 750               | 21,1                           | 16              | 2 600                   | 1 470                    |
| 406                 | 654   | 5     | 585                | 980               | 27                             | 15,6            | 2 000                   | 1 150                    |
| 406                 | 654   | 5     | 585                | 980               | 27                             | 15,6            | 2 000                   | 1 150                    |
| 412                 | 748   | 6     | 830                | 1 460             | 42,5                           | 14,8            | 1 800                   | 1 020                    |
| 412                 | 748   | 6     | 830                | 1 460             | 42,5                           | 14,8            | 1 800                   | 1 020                    |

# Deep groove ball bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions |       |     |           |                     |                     |
|-------------|------------------|------------|-------|-----|-----------|---------------------|---------------------|
|             |                  | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| 60880-M     | 15,3             | 400        | 500   | 31  | 2         | 464,1               | 436,7               |
| 61880-M     | 21,5             | 400        | 500   | 46  | 2,1       | 467,3               | 433,7               |
| 60980-M     | 31,7             | 400        | 540   | 44  | 3         | 488,1               | 452,8               |
| 61980-M     | 42,5             | 400        | 540   | 65  | 4         | 498                 | 443,6               |
| 61980-MA    | 42,7             | 400        | 540   | 65  | 4         | 499,3               | 443,6               |
| 61980-MB    | 42,6             | 400        | 540   | 65  | 4         | 498                 | 442,5               |
| 61980-MB-C3 | 42,6             | 400        | 540   | 65  | 4         | 498                 | 442,5               |
| 16080-M     | 69,3             | 400        | 600   | 63  | 5         | 525,8               | 472                 |
| 6080-M      | 90,6             | 400        | 600   | 90  | 5         | 536,3               | 465                 |
| 6080-M-C3   | 90,6             | 400        | 600   | 90  | 5         | 536,3               | 465                 |
| 6080-MB-C3  | 90,6             | 400        | 600   | 90  | 5         | 536,3               | 465                 |
| F-801513.KL | 90,6             | 400        | 600   | 90  | 5         | 536,3               | 465                 |
| 6280-M      | 203              | 400        | 720   | 103 | 6         | 606,2               | 515,7               |
| 6280-M-C3   | 203              | 400        | 720   | 103 | 6         | 606,2               | 515,7               |
| 6380-M      | 371              | 400        | 820   | 136 | 7,5       | 672                 | 551,5               |
| 6380-M-C3   | 371              | 400        | 820   | 136 | 7,5       | 672                 | 551,5               |
| 60884-M     | 15,9             | 420        | 520   | 31  | 2         | 484,4               | 456,4               |
| 61884-M     | 22,8             | 420        | 520   | 46  | 2,1       | 485,8               | 454,3               |
| Z-576366.KL | 45,4             | 420        | 559,5 | 65  | 4         | 517,9               | 463,5               |
| 60984-M     | 33,3             | 420        | 560   | 44  | 3         | 508,1               | 472,9               |
| 61984-M     | 45,6             | 420        | 560   | 65  | 4         | 517,9               | 463,5               |
| 61984-MA    | 47,2             | 420        | 560   | 65  | 4         | 519,3               | 463,5               |
| 61984-MB    | 44,9             | 420        | 560   | 65  | 4         | 517,9               | 462,4               |
| 61984-MB-C3 | 44,9             | 420        | 560   | 65  | 4         | 517,9               | 462,4               |
| Z-544178.KL | 57               | 420        | 580   | 70  | 4         | 529                 | 473                 |
| Z-508748.KL | 60,2             | 420        | 580   | 72  | 3         | 528                 | 472                 |
| 16084-M     | 72,1             | 420        | 620   | 63  | 5         | 547                 | 494                 |
| 6084-M      | 99,7             | 420        | 620   | 90  | 5         | 556,4               | 484,9               |
| 6084-MB-C3  | 99,7             | 420        | 620   | 90  | 5         | 556,4               | 484,9               |

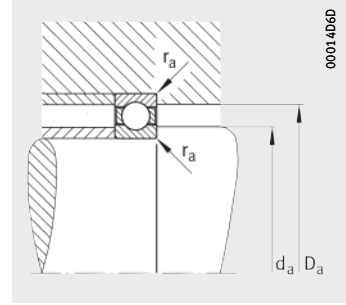
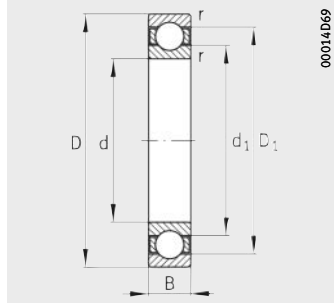




| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Factor<br>$f_0$ | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-----------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |                 |  |   |
| 408,8               | 491,2         | 2             | 170                 | 275                     | 7,4                                  | 15,7            | 2 800  | 1 100   |
| 410,2               | 489,8         | 2,1           | 220                 | 335                     | 8,8                                  | 15,9            | 2 800  | 1 340   |
| 412,4               | 527,6         | 2,5           | 245                 | 390                     | 10,6                                 | 15,9            | 2 800  | 1 200   |
| 414,6               | 525,4         | 3             | 375                 | 620                     | 15,7                                 | 16,5            | 2 600  | 1 360   |
| 414,6               | 525,4         | 3             | 375                 | 620                     | 15,7                                 | 16,5            | 2 600  | 1 360   |
| 414,6               | 525,4         | 3             | 375                 | 620                     | 15,7                                 | 16,5            | 2 600  | 1 360   |
| 414,6               | 525,4         | 3             | 375                 | 620                     | 15,7                                 | 16,5            | 2 600  | 1 360   |
| 418                 | 582           | 4             | 380                 | 630                     | 19,1                                 | 16,5            | 2 400  | 1 240   |
| 418                 | 582           | 4             | 520                 | 865                     | 23,5                                 | 15,9            | 2 200  | 1 390   |
| 418                 | 582           | 4             | 520                 | 865                     | 23,5                                 | 15,9            | 2 200  | 1 390   |
| 418                 | 582           | 4             | 520                 | 865                     | 23,5                                 | 15,9            | 2 200  | 1 390   |
| 418                 | 582           | 4             | 520                 | 865                     | 23,5                                 | 15,9            | 2 200  | –   |
| 402,4               | 717,6         | 5             | 620                 | 1 080                   | 27                                   | 15,6            | 1 900  | 1 100   |
| 402,4               | 717,6         | 5             | 620                 | 1 080                   | 27                                   | 15,6            | 1 900  | 1 100   |
| 432                 | 788           | 6             | 865                 | 1 600                   | 44                                   | 14,9            | 1 700  | 980   |
| 432                 | 788           | 6             | 865                 | 1 600                   | 44                                   | 14,9            | 1 700  | 980   |
| 428,8               | 511,2         | 2             | 173                 | 285                     | 8                                    | 15,6            | 2 800  | 1 000   |
| 430,2               | 509,8         | 2,1           | 224                 | 345                     | 9,2                                  | 15,9            | 2 800  | 1 260   |
| 434,6               | 545,4         | 3             | 390                 | 655                     | 16,3                                 | 16,5            | 2 600  | –   |
| 432,4               | 547,6         | 2,5           | 250                 | 400                     | 10,8                                 | 15,9            | 2 600  | 1 100   |
| 434,6               | 545,4         | 3             | 390                 | 655                     | 16,3                                 | 16,5            | 2 600  | 1 280   |
| 434,6               | 545,4         | 3             | 390                 | 655                     | 16,3                                 | 16,5            | 2 600  | 1 280   |
| 434,6               | 545,4         | 3             | 390                 | 655                     | 16,3                                 | 16,5            | 2 600  | 1 280   |
| 434,6               | 545,4         | 3             | 390                 | 655                     | 16,3                                 | 16,5            | 2 600  | 1 280   |
| 434,6               | 565,4         | 3             | 380                 | 640                     | 14,4                                 | 16,5            | 2 400  | –   |
| 432,4               | 567,6         | 2,5           | 380                 | 630                     | 19,1                                 | 16,5            | 2 400  | –   |
| 438                 | 602           | 4             | 390                 | 670                     | 16,8                                 | 16,4            | 2 200  | 1 170   |
| 438                 | 602           | 4             | 530                 | 930                     | 24,4                                 | 16              | 2 200  | 1 310   |
| 438                 | 602           | 4             | 530                 | 930                     | 24,4                                 | 16              | 2 200  | 1 310   |

# Deep groove ball bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

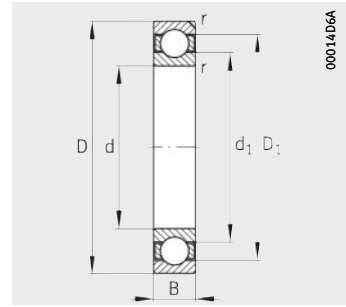
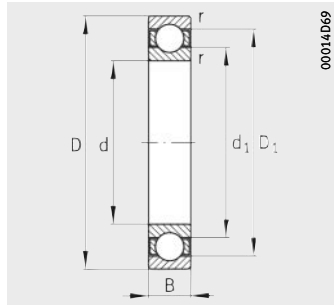
| Designation | Mass<br>m<br>≈kg | Dimensions |     |     |           |                     |                     |
|-------------|------------------|------------|-----|-----|-----------|---------------------|---------------------|
|             |                  | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| 60888-M     | 16,8             | 440        | 540 | 31  | 2         | 504,1               | 476,7               |
| 61888-M     | 23,8             | 440        | 540 | 46  | 2,1       | 505,9               | 474,2               |
| 60988-M     | 45,5             | 440        | 600 | 50  | 4         | 540,9               | 500,2               |
| 61988-M     | 62,1             | 440        | 600 | 74  | 4         | 549,2               | 492,4               |
| 61988-MB-C3 | 62,1             | 440        | 600 | 74  | 4         | 549,2               | 492,4               |
| 16088-M     | 86,3             | 440        | 650 | 67  | 5         | 566,8               | 514                 |
| 6088-M      | 108              | 440        | 650 | 94  | 6         | 583,6               | 507,7               |
| 6088-MB-C3  | 108              | 440        | 650 | 94  | 6         | 583,6               | 507,7               |
| 60892-M     | 26               | 460        | 580 | 37  | 2,1       | 535,6               | 504,4               |
| 61892-M     | 35,8             | 460        | 580 | 56  | 3         | 540,9               | 500,2               |
| 61892-MA    | 36,7             | 460        | 580 | 56  | 3         | 542                 | 500,2               |
| 60992-M     | 46,2             | 460        | 620 | 50  | 4         | 561                 | 520                 |
| 61992-M     | 64,6             | 460        | 620 | 74  | 4         | 569,2               | 512,4               |
| 61992-MA    | 64,6             | 460        | 620 | 74  | 4         | 570,4               | 512,4               |
| 61992-MB-C3 | 64,6             | 460        | 620 | 74  | 4         | 569,2               | 512,4               |
| F-803489.KL | 126              | 460        | 679 | 100 | 6         | 612,6               | 528,7               |
| 16092-M     | 95,9             | 460        | 680 | 71  | 5         | 595,5               | 536,1               |
| 6092-M      | 125              | 460        | 680 | 100 | 6         | 612,6               | 529,8               |
| 6092-MB-C3  | 127              | 460        | 680 | 100 | 6         | 612,6               | 528,7               |
| F-804931.KL | 18,1             | 480        | 580 | 30  | 2         | 543,1               | 517,7               |
| 60896-M     | 26,6             | 480        | 600 | 37  | 2,1       | 555,6               | 524,4               |
| 61896-M     | 37,3             | 480        | 600 | 56  | 3         | 560,9               | 520,3               |
| 61896-MA    | 38,6             | 480        | 600 | 56  | 3         | 562                 | 520,3               |
| 60996-M     | 57               | 480        | 650 | 54  | 4         | 587,9               | 544                 |
| 61996-M     | 75,6             | 480        | 650 | 78  | 5         | 595,4               | 536,2               |
| 61996-MA    | 78,7             | 480        | 650 | 78  | 5         | 596,9               | 536,2               |
| 61996-MB    | 74,6             | 480        | 650 | 78  | 5         | 595,4               | 535                 |
| 61996-MB-C3 | 74,6             | 480        | 650 | 78  | 5         | 595,4               | 535                 |
| F-801512.KL | 104              | 480        | 680 | 90  | 6         | 618,6               | 543,8               |
| 16096-M     | 100              | 480        | 700 | 71  | 5         | 615,4               | 556,1               |
| 6096-M      | 129              | 480        | 700 | 100 | 6         | 632,8               | 549,6               |
| 6096-MB-C3  | 129              | 480        | 700 | 100 | 6         | 632,8               | 549,6               |



| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Factor<br>$f_0$ | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-----------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |                 |  |   |
| 448,8               | 531,2         | 2             | 173                 | 290                     | 7,6                                  | 15,6            | 2 600  | 1 000   |
| 450,2               | 529,8         | 2,1           | 228                 | 355                     | 9,4                                  | 15,8            | 2 600  | 1 190   |
| 454,6               | 585,4         | 3             | 290                 | 480                     | 12                                   | 16              | 2 400  | 1 100   |
| 454,6               | 585,4         | 3             | 400                 | 695                     | 17,6                                 | 16,5            | 2 200  | 1 250   |
| 454,6               | 585,4         | 3             | 400                 | 695                     | 17,6                                 | 16,5            | 2 200  | 1 250   |
| 458                 | 632           | 4             | 400                 | 710                     | 17,2                                 | 16,4            | 2 200  | 1 140   |
| 463                 | 627           | 5             | 550                 | 965                     | 25,5                                 | 16              | 2 000  | 1 250   |
| 463                 | 627           | 5             | 550                 | 965                     | 25,5                                 | 16              | 2 000  | 1 250   |
| 470,2               | 569,8         | 2,1           | 228                 | 375                     | 10,2                                 | 15,7            | 2 400  | 950   |
| 472,4               | 567,6         | 2,5           | 290                 | 480                     | 12                                   | 16              | 2 400  | 1 170   |
| 472,4               | 567,6         | 2,5           | 290                 | 480                     | 12                                   | 16              | 2 400  | 1 170   |
| 474,6               | 605,4         | 3             | 305                 | 520                     | 13,3                                 | 16              | 2 200  | 1 000   |
| 474,6               | 605,4         | 3             | 415                 | 735                     | 18,1                                 | 16,4            | 2 200  | 1 180   |
| 474,6               | 605,4         | 3             | 415                 | 735                     | 18,1                                 | 16,4            | 2 200  | 1 180   |
| 474,6               | 605,4         | 3             | 415                 | 735                     | 18,1                                 | 16,4            | 2 200  | 1 180   |
| 483                 | 656           | 5             | 585                 | 1 060                   | 27                                   | 16              | 1 900  | –   |
| 478                 | 662           | 4             | 440                 | 815                     | 19,6                                 | 16,4            | 2 000  | 1 090   |
| 483                 | 657           | 5             | 585                 | 1 060                   | 27                                   | 16              | 1 900  | 1 200   |
| 483                 | 657           | 5             | 585                 | 1 060                   | 27                                   | 16              | 1 900  | 1 200   |
| 488,8               | 571,2         | 2             | 156                 | 280                     | 6,9                                  | 15,5            | 2 400  | –   |
| 490,2               | 589,8         | 2,1           | 232                 | 390                     | 10,3                                 | 15,6            | 2 200  | 900   |
| 492,4               | 587,6         | 2,5           | 290                 | 500                     | 12,1                                 | 15,9            | 2 200  | 1 110   |
| 492,4               | 587,6         | 2,5           | 290                 | 500                     | 12,1                                 | 15,9            | 2 200  | 1 110   |
| 494,6               | 635,4         | 3             | 325                 | 570                     | 14,1                                 | 16              | 2 000  | 1 000   |
| 498                 | 632           | 4             | 440                 | 815                     | 18,4                                 | 16,4            | 2 000  | 1 130   |
| 498                 | 632           | 4             | 440                 | 815                     | 18,4                                 | 16,4            | 2 000  | 1 130   |
| 498                 | 632           | 4             | 440                 | 815                     | 18,4                                 | 16,4            | 2 000  | 1 130   |
| 498                 | 632           | 4             | 440                 | 815                     | 18,4                                 | 16,4            | 2 000  | 1 130   |
| 503                 | 657           | 5             | 520                 | 950                     | 22,8                                 | 16,3            | 1 900  | –   |
| 498                 | 682           | 4             | 440                 | 800                     | 19,2                                 | 16,4            | 1 900  | 1 040   |
| 503                 | 677           | 5             | 610                 | 1 140                   | 28,5                                 | 16              | 1 900  | 1 140   |
| 503                 | 677           | 5             | 610                 | 1 140                   | 28,5                                 | 16              | 1 900  | 1 140   |

# Deep groove ball bearings

Single row

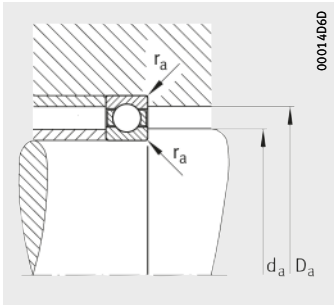


With retaining slot

**Dimension table** (continued) · Dimensions in mm

| Designation                     | Mass<br>m<br>≈kg | Dimensions |     |     |           |                     |                     |
|---------------------------------|------------------|------------|-----|-----|-----------|---------------------|---------------------|
|                                 |                  | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| <b>608/500-M</b>                | 27,9             | <b>500</b> | 620 | 37  | 2,1       | 575,6               | 544,4               |
| <b>618/500-M</b>                | 38,7             | <b>500</b> | 620 | 56  | 3         | 580,9               | 540,4               |
| <b>618/500-MA</b>               | 40,2             | <b>500</b> | 620 | 56  | 3         | 582                 | 540,4               |
| <b>618/500-MB</b>               | 40,1             | <b>500</b> | 620 | 56  | 3         | 580,9               | 539,3               |
| <b>609/500-M</b>                | 59               | <b>500</b> | 670 | 54  | 4         | 607,9               | 564                 |
| <b>619/500-M</b>                | 79               | <b>500</b> | 670 | 78  | 5         | 615,4               | 556,2               |
| <b>619/500-MA</b>               | 79               | <b>500</b> | 670 | 78  | 5         | 615,4               | 556,2               |
| <b>619/500-MB</b>               | 79               | <b>500</b> | 670 | 78  | 5         | 615,4               | 556,2               |
| <b>619/500-MB-C3</b>            | 79               | <b>500</b> | 670 | 78  | 5         | 615,4               | 556,2               |
| <b>F-804943.KL</b>              | 81,2             | <b>500</b> | 670 | 78  | 5         | 616,9               | 555,9               |
| <b>Z-530352.KL</b>              | 116              | <b>500</b> | 700 | 100 | 6         | 640                 | 562                 |
| <b>160/500-M</b>                | 105              | <b>500</b> | 720 | 71  | 5         | 635,9               | 581,7               |
| <b>60/500-M</b>                 | 133              | <b>500</b> | 720 | 100 | 6         | 657,4               | 574,9               |
| <b>60/500-MB-C3</b>             | 133              | <b>500</b> | 720 | 100 | 6         | 657,4               | 574,9               |
| <b>F-800562.KL</b>              | 132              | <b>520</b> | 719 | 100 | 5         | 660,5               | 582                 |
| <b>608/530-M</b>                | 29,4             | <b>530</b> | 650 | 37  | 2,1       | 605,6               | 574,4               |
| <b>618/530-M</b>                | 41,3             | <b>530</b> | 650 | 56  | 3         | 610,8               | 570,4               |
| <b>618/530-MA</b>               | 42,4             | <b>530</b> | 650 | 56  | 3         | 612                 | 570,4               |
| <b>618/530-MB</b>               | 42,3             | <b>530</b> | 650 | 56  | 3         | 610,8               | 569,3               |
| <b>609/530-M</b>                | 69,8             | <b>530</b> | 710 | 57  | 4         | 646                 | 595,3               |
| <b>619/530-M</b>                | 92               | <b>530</b> | 710 | 82  | 5         | 652,3               | 589,7               |
| <b>619/530-MB</b>               | 92               | <b>530</b> | 710 | 82  | 5         | 652,3               | 589,7               |
| <b>619/530-MB-C3</b>            | 92               | <b>530</b> | 710 | 82  | 5         | 652,3               | 589,7               |
| <b>Z-508780.KL<sup>1)</sup></b> | 157              | <b>530</b> | 760 | 100 | 6         | 683                 | 606                 |
| <b>160/530-M</b>                | 142              | <b>530</b> | 780 | 80  | 6         | 688,7               | 624,7               |
| <b>60/530-M</b>                 | 185              | <b>530</b> | 780 | 112 | 6         | 701,8               | 610,3               |
| <b>60/530-MB-C3</b>             | 185              | <b>530</b> | 780 | 112 | 6         | 701,8               | 610,3               |
| <b>Z-529220.KL<sup>1)</sup></b> | 190              | <b>530</b> | 780 | 112 | 6         | 701,8               | 609,3               |
| <b>608/560-M</b>                | 30,5             | <b>560</b> | 680 | 37  | 2,1       | 636,7               | 604,3               |
| <b>618/560-M</b>                | 35,1             | <b>560</b> | 680 | 56  | 3         | 640,7               | 600,4               |
| <b>618/560-MA</b>               | 34,8             | <b>560</b> | 680 | 56  | 3         | 642                 | 600,4               |
| <b>618/560-MB</b>               | 44,5             | <b>560</b> | 680 | 56  | 3         | 640,7               | 599,3               |
| <b>609/560-M</b>                | 81,6             | <b>560</b> | 750 | 60  | 4         | 681                 | 630,4               |
| <b>619/560-M</b>                | 107              | <b>560</b> | 750 | 85  | 5         | 690                 | 623,9               |

<sup>1)</sup> With retaining slot.

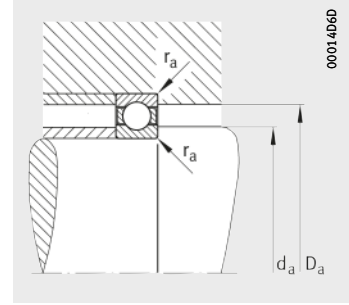
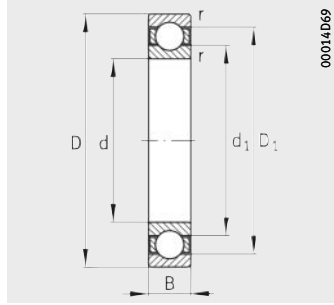


Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                   | Fatigue limit load<br>$C_{ur}$ | Factor<br>$f_0$ | Limiting speed<br>$n_G$ | Reference speed<br>$n_B$ |
|---------------------|-------|-------|--------------------|-------------------|--------------------------------|-----------------|-------------------------|--------------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ |                                |                 |                         |                          |
| min.                | max.  | max.  | kN                 | kN                | kN                             |                 | $\text{min}^{-1}$       | $\text{min}^{-1}$        |
| 510,2               | 609,8 | 2,1   | 232                | 405               | 10,3                           | 15,6            | 2 200                   | 850                      |
| 512,4               | 607,6 | 2,5   | 300                | 510               | 12,3                           | 15,9            | 2 000                   | 1 060                    |
| 512,4               | 607,6 | 2,5   | 300                | 510               | 12,3                           | 15,9            | 2 000                   | 1 060                    |
| 512,4               | 607,6 | 2,5   | 300                | 510               | 12,3                           | 15,9            | 2 000                   | 1 060                    |
| 514,6               | 655,4 | 3     | 325                | 585               | 14,6                           | 15,9            | 2 000                   | 950                      |
| 518                 | 652   | 4     | 440                | 800               | 18,2                           | 16,4            | 1 900                   | 1 080                    |
| 518                 | 652   | 4     | 440                | 800               | 18,2                           | 16,4            | 1 900                   | 1 080                    |
| 518                 | 652   | 4     | 440                | 800               | 18,2                           | 16,4            | 1 900                   | 1 080                    |
| 518                 | 652   | 4     | 440                | 800               | 18,2                           | 16,4            | 1 900                   | 1 080                    |
| 518                 | 652   | 4     | 440                | 800               | 18,2                           | 16,4            | 1 900                   | –                        |
| 523                 | 677   | 5     | 585                | 1 120             | 27                             | 16,2            | 900                     | –                        |
| 518                 | 702   | 4     | 425                | 780               | 22                             | 16,3            | 1 900                   | 980                      |
| 523                 | 697   | 5     | 610                | 1 140             | 27,5                           | 16,1            | 1 800                   | 1 100                    |
| 523                 | 697   | 5     | 610                | 1 140             | 27,5                           | 16,1            | 1 800                   | 1 100                    |
| 538                 | 701   | 4     | 585                | 1 120             | 24,7                           | 16,3            | 1 800                   | –                        |
| 540,2               | 639,8 | 2,1   | 236                | 425               | 10,5                           | 15,6            | 2 000                   | 800                      |
| 542,4               | 637,6 | 2,5   | 305                | 550               | 12,8                           | 15,8            | 2 000                   | 980                      |
| 542,4               | 637,6 | 2,5   | 305                | 550               | 12,8                           | 15,8            | 2 000                   | 980                      |
| 542,4               | 637,6 | 2,5   | 305                | 550               | 12,8                           | 15,8            | 2 000                   | 980                      |
| 544,6               | 695,4 | 3     | 380                | 720               | 17,1                           | 16              | 1 900                   | 850                      |
| 548                 | 692   | 4     | 465                | 880               | 20                             | 16,3            | 1 800                   | 1 010                    |
| 548                 | 692   | 4     | 465                | 880               | 20                             | 16,3            | 1 800                   | 1 010                    |
| 548                 | 692   | 4     | 465                | 880               | 20                             | 16,3            | 1 800                   | 1 010                    |
| 553                 | 737   | 5     | 600                | 1 160             | 26,5                           | 16,3            | 1 700                   | –                        |
| 553                 | 757   | 5     | 510                | 1 000             | 22,5                           | 16,3            | 1 700                   | 920                      |
| 553                 | 757   | 5     | 710                | 1 400             | 32,5                           | 16              | 1 700                   | 1 000                    |
| 553                 | 757   | 5     | 710                | 1 400             | 32,5                           | 16              | 1 700                   | 1 000                    |
| 553                 | 757   | 5     | 710                | 1 400             | 32,5                           | 16              | 1 700                   | –                        |
| 570,2               | 669,8 | 2,1   | 240                | 440               | 9,9                            | 15,5            | 1 900                   | 750                      |
| 572,4               | 667,6 | 2,5   | 310                | 560               | 12,8                           | 15,8            | 1 900                   | 920                      |
| 572,4               | 667,6 | 2,5   | 310                | 560               | 12,8                           | 15,8            | 1 900                   | 920                      |
| 572,4               | 667,6 | 2,5   | 310                | 560               | 12,8                           | 15,8            | 1 900                   | 920                      |
| 574,6               | 735,4 | 3     | 390                | 735               | 16,5                           | 16              | 1 800                   | 800                      |
| 578                 | 732   | 4     | 510                | 1 000             | 22,5                           | 16,3            | 1 700                   | 940                      |

# Deep groove ball bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

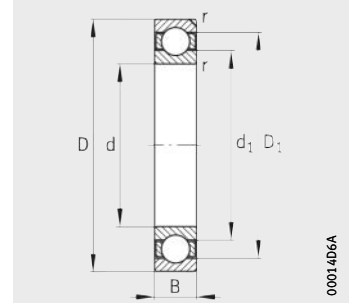
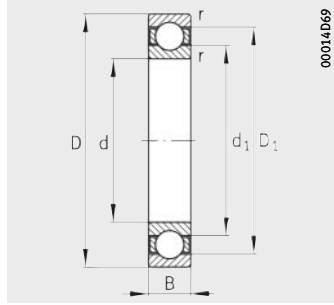
| Designation          | Mass<br>m<br>≈kg | Dimensions |     |     |           |                     |                     |
|----------------------|------------------|------------|-----|-----|-----------|---------------------|---------------------|
|                      |                  | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| <b>619/560-MA</b>    | 107              | <b>560</b> | 750 | 85  | 5         | 690                 | 623,9               |
| <b>619/560-MB</b>    | 107              | <b>560</b> | 750 | 85  | 5         | 690                 | 623,9               |
| <b>619/560-MB-C3</b> | 107              | <b>560</b> | 750 | 85  | 5         | 690                 | 623,9               |
| <b>160/560-M</b>     | 137              | <b>560</b> | 820 | 82  | 6         | 732,7               | 668,3               |
| <b>60/560-M</b>      | 209              | <b>560</b> | 820 | 115 | 6         | 740,4               | 643,2               |
| <b>60/560-MB-C3</b>  | 209              | <b>560</b> | 820 | 115 | 6         | 740,4               | 643,2               |
| <b>608/600-M</b>     | 40,1             | <b>600</b> | 730 | 42  | 3         | 683,3               | 647,8               |
| <b>618/600-M</b>     | 54,2             | <b>600</b> | 730 | 60  | 3         | 687,8               | 643,6               |
| <b>618/600-MA</b>    | 54,3             | <b>600</b> | 730 | 60  | 3         | 689                 | 643,6               |
| <b>609/600-M</b>     | 96,7             | <b>600</b> | 800 | 63  | 5         | 728,1               | 673,5               |
| <b>619/600-M</b>     | 128              | <b>600</b> | 800 | 90  | 5         | 736                 | 666                 |
| <b>619/600-MA</b>    | 128              | <b>600</b> | 800 | 90  | 5         | 736                 | 666                 |
| <b>619/600-MB</b>    | 128              | <b>600</b> | 800 | 90  | 5         | 736                 | 666                 |
| <b>619/600-MB-C3</b> | 128              | <b>600</b> | 800 | 90  | 5         | 736                 | 666                 |
| <b>160/600-M</b>     | 180              | <b>600</b> | 870 | 85  | 6         | 771                 | 700,5               |
| <b>60/600-M</b>      | 238              | <b>600</b> | 870 | 118 | 6         | 785,4               | 688                 |
| <b>60/600-MB-C3</b>  | 238              | <b>600</b> | 870 | 118 | 6         | 785,4               | 688                 |
| <b>608/630-M</b>     | 56,1             | <b>630</b> | 780 | 48  | 3         | 725,9               | 685,4               |
| <b>618/630-M</b>     | 75,9             | <b>630</b> | 780 | 69  | 4         | 730,5               | 681,1               |
| <b>618/630-MA</b>    | 77,3             | <b>630</b> | 780 | 69  | 4         | 732                 | 681,1               |
| <b>609/630-M</b>     | 126              | <b>630</b> | 850 | 71  | 5         | 769                 | 711                 |
| <b>619/630-M</b>     | 167              | <b>630</b> | 850 | 100 | 6         | 780,3               | 701,7               |
| <b>619/630-MA</b>    | 167              | <b>630</b> | 850 | 100 | 6         | 780,3               | 701,7               |
| <b>619/630-MB</b>    | 167              | <b>630</b> | 850 | 100 | 6         | 780,3               | 701,7               |
| <b>619/630-MB-C3</b> | 167              | <b>630</b> | 850 | 100 | 6         | 780,3               | 701,7               |
| <b>160/630-M</b>     | 220              | <b>630</b> | 920 | 92  | 6         | 813,5               | 738,5               |
| <b>60/630-M</b>      | 287              | <b>630</b> | 920 | 128 | 7,5       | 831,9               | 721,2               |
| <b>60/630-MB-C3</b>  | 287              | <b>630</b> | 920 | 128 | 7,5       | 831,9               | 721,2               |
| <b>Z-508308.KL</b>   | 327              | <b>640</b> | 940 | 128 | 7,5       | 844                 | 740                 |
| <b>F-800564.KL</b>   | 268              | <b>650</b> | 919 | 118 | 6         | 831,8               | 738,7               |
| <b>Z-514645.KL</b>   | 262              | <b>650</b> | 920 | 118 | 6         | 828,7               | 738,7               |



| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Factor<br>$f_0$ | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-----------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |                 |  |   |
| 578                 | 732           | 4             | 510                 | 1 000                   | 22,5                                 | 16,3            | 1 700  | 940   |
| 578                 | 732           | 4             | 510                 | 1 000                   | 22,5                                 | 16,3            | 1 700  | 940   |
| 578                 | 732           | 4             | 510                 | 1 000                   | 22,5                                 | 16,3            | 1 700  | 940   |
| 583                 | 797           | 5             | 550                 | 1 120                   | 24,1                                 | 16,3            | 1 600  | 840   |
| 583                 | 797           | 5             | 765                 | 1 530                   | 35,5                                 | 16              | 1 600  | 950   |
| 583                 | 797           | 5             | 765                 | 1 530                   | 35,5                                 | 16              | 1 600  | 950   |
| 612,4               | 717,6         | 2,5           | 255                 | 475                     | 10,6                                 | 15,5            | 1 800  | 700   |
| 612,4               | 717,6         | 2,5           | 355                 | 670                     | 15                                   | 15,8            | 1 800  | 850   |
| 612,4               | 717,6         | 2,5           | 355                 | 670                     | 15                                   | 15,8            | 1 800  | 850   |
| 618                 | 782           | 4             | 440                 | 880                     | 18,7                                 | 16              | 1 600  | 750   |
| 618                 | 782           | 4             | 550                 | 1 120                   | 23,6                                 | 16,3            | 1 600  | 880   |
| 618                 | 782           | 4             | 550                 | 1 120                   | 23,6                                 | 16,3            | 1 600  | 880   |
| 618                 | 782           | 4             | 550                 | 1 120                   | 23,6                                 | 16,3            | 1 600  | 880   |
| 618                 | 782           | 4             | 550                 | 1 120                   | 23,6                                 | 16,3            | 1 600  | 880   |
| 623                 | 847           | 5             | 550                 | 1 120                   | 23,4                                 | 16,3            | 1 500  | 800   |
| 623                 | 847           | 5             | 780                 | 1 660                   | 36,5                                 | 16,1            | 1 500  | 850   |
| 623                 | 847           | 5             | 780                 | 1 660                   | 36,5                                 | 16,1            | 1 500  | 850   |
| 642,4               | 767,6         | 2,5           | 320                 | 630                     | 14,2                                 | 15,6            | 1 700  | 700   |
| 644,6               | 765,4         | 3             | 400                 | 780                     | 17,5                                 | 15,9            | 1 600  | 830   |
| 644,6               | 765,4         | 3             | 400                 | 780                     | 17,5                                 | 15,9            | 1 600  | 830   |
| 648                 | 832           | 4             | 480                 | 1 000                   | 21,7                                 | 16              | 1 500  | 750   |
| 653                 | 827           | 5             | 630                 | 1 320                   | 28                                   | 16,4            | 1 500  | 840   |
| 653                 | 827           | 5             | 630                 | 1 320                   | 28                                   | 16,4            | 1 500  | 840   |
| 653                 | 827           | 5             | 630                 | 1 320                   | 28                                   | 16,4            | 1 500  | 840   |
| 653                 | 827           | 5             | 630                 | 1 320                   | 28                                   | 16,4            | 1 500  | 840   |
| 653                 | 897           | 5             | 585                 | 1 250                   | 25                                   | 16,3            | 1 400  | 770   |
| 658                 | 892           | 6             | 880                 | 1 900                   | 41,5                                 | 16              | 1 300  | 800   |
| 658                 | 892           | 6             | 880                 | 1 900                   | 41,5                                 | 16              | 1 300  | 800   |
| 668                 | 912           | 6             | 815                 | 1 760                   | 36                                   | 16,2            | 1 300  | –   |
| 673                 | 897           | 5             | 750                 | 1 630                   | 33                                   | 16,4            | 1 400  | –   |
| 673                 | 897           | 5             | 750                 | 1 630                   | 33                                   | 16,4            | 1 400  | –   |

# Deep groove ball bearings

Single row



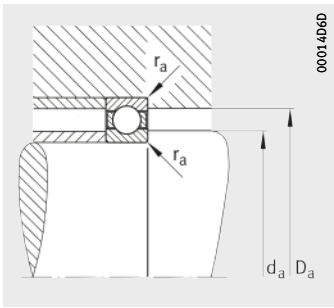
With retaining slot

Dimension table (continued) · Dimensions in mm

| Designation               | Mass<br>m<br>≈kg | Dimensions |      |     |           |                     |                     |
|---------------------------|------------------|------------|------|-----|-----------|---------------------|---------------------|
|                           |                  | d          | D    | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| 608/670-M                 | 59,6             | 670        | 820  | 48  | 3         | 765                 | 726                 |
| 618/670-M                 | 80,4             | 670        | 820  | 69  | 4         | 770,3               | 721,1               |
| 618/670-MA                | 84,7             | 670        | 820  | 69  | 4         | 772                 | 721,1               |
| Z-509029.KL               | 118              | 670        | 850  | 85  | 6         | 792,5               | 727,5               |
| 609/670-M                 | 144              | 670        | 900  | 73  | 5         | 816,7               | 755                 |
| 619/670-M                 | 192              | 670        | 900  | 103 | 6         | 822,2               | 749,5               |
| 619/670-MA                | 192              | 670        | 900  | 103 | 6         | 822,2               | 749,5               |
| 619/670-MB                | 192              | 670        | 900  | 103 | 6         | 822,2               | 749,5               |
| 619/670-MB-C3             | 192              | 670        | 900  | 103 | 6         | 822,2               | 749,5               |
| 160/670-M                 | 272              | 670        | 980  | 100 | 6         | 867,5               | 785                 |
| 60/670-M                  | 350              | 670        | 980  | 136 | 7,5       | 884,2               | 769,4               |
| 60/670-MB-C3              | 350              | 670        | 980  | 136 | 7,5       | 884,2               | 769,4               |
| 608/710-M                 | 69,9             | 710        | 870  | 50  | 4         | 812,7               | 770                 |
| 618/710-M                 | 96               | 710        | 870  | 74  | 4         | 818,9               | 762,7               |
| 618/710-MA                | 98,6             | 710        | 870  | 74  | 4         | 820,4               | 762,7               |
| 609/710-M                 | 165              | 710        | 950  | 78  | 5         | 862                 | 800                 |
| 619/710-M                 | 218              | 710        | 950  | 106 | 6         | 869,1               | 792,5               |
| 619/710-MA                | 218              | 710        | 950  | 106 | 6         | 869,1               | 792,5               |
| 619/710-MB                | 218              | 710        | 950  | 106 | 6         | 869,1               | 792,5               |
| 619/710-MB-C3             | 218              | 710        | 950  | 106 | 6         | 869,1               | 792,5               |
| Z-502954.KL               | 368              | 710        | 1000 | 140 | 7,5       | 911,5               | 800                 |
| 160/710-M                 | 305              | 710        | 1030 | 103 | 6         | 914,5               | 828                 |
| 60/710-M                  | 394              | 710        | 1030 | 140 | 7,5       | 931,1               | 812,6               |
| 60/710-MB-C3              | 394              | 710        | 1030 | 140 | 7,5       | 931,1               | 812,6               |
| Z-534196.KL <sup>1)</sup> | 394              | 710        | 1030 | 140 | 7,5       | 931,5               | 812,6               |
| Z-528283.KL <sup>1)</sup> | 534              | 710        | 1080 | 160 | 7,5       | 962                 | 826                 |
| 608/750-M                 | 84,4             | 750        | 920  | 54  | 4         | 859                 | 812,4               |
| 618/750-M                 | 114              | 750        | 920  | 78  | 5         | 864,9               | 806,7               |
| 618/750-MA                | 117              | 750        | 920  | 78  | 5         | 866,9               | 806,7               |
| 609/750-M                 | 186              | 750        | 1000 | 80  | 6         | 910                 | 843                 |
| 619/750-M                 | 248              | 750        | 1000 | 112 | 6         | 919,2               | 833,2               |
| 619/750-MA                | 248              | 750        | 1000 | 112 | 6         | 919,2               | 833,2               |
| 619/750-MB                | 248              | 750        | 1000 | 112 | 6         | 919,2               | 833,2               |
| 619/750-MB-C3             | 248              | 750        | 1000 | 112 | 6         | 919,2               | 833,2               |

<sup>1)</sup> With retaining slot; radial internal clearance C4.



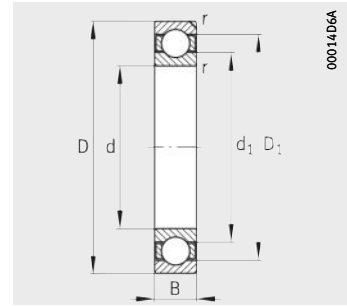
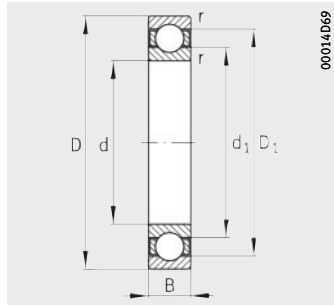


Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                   | Fatigue limit load<br>$C_{ur}$ | Factor<br>$f_0$ | Limiting speed<br>$n_G$ | Reference speed<br>$n_B$ |
|---------------------|-------|-------|--------------------|-------------------|--------------------------------|-----------------|-------------------------|--------------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ |                                |                 |                         |                          |
| min.                | max.  | max.  | kN                 | kN                | kN                             |                 | $\text{min}^{-1}$       | $\text{min}^{-1}$        |
| 682,4               | 807,6 | 2,5   | 325                | 655               | 14,4                           | 15,6            | 1 600                   | 630                      |
| 684,6               | 805,4 | 3     | 405                | 815               | 17,7                           | 15,8            | 1 500                   | 770                      |
| 684,6               | 805,4 | 3     | 405                | 815               | 17,7                           | 15,8            | 1 500                   | 770                      |
| 693                 | 827   | 5     | 550                | 1 180             | 24,5                           | 16,1            | 1 500                   | –                        |
| 688                 | 882   | 4     | 520                | 1 120             | 23,6                           | 16              | 1 400                   | 670                      |
| 693                 | 877   | 5     | 640                | 1 370             | 27,5                           | 16,3            | 1 400                   | 780                      |
| 693                 | 877   | 5     | 640                | 1 370             | 27,5                           | 16,3            | 1 400                   | 780                      |
| 693                 | 877   | 5     | 640                | 1 370             | 27,5                           | 16,3            | 1 400                   | 780                      |
| 693                 | 877   | 5     | 640                | 1 370             | 27,5                           | 16,3            | 1 400                   | 780                      |
| 693                 | 957   | 5     | 655                | 1 460             | 28,5                           | 16,3            | 1 300                   | 720                      |
| 698                 | 952   | 6     | 965                | 2 160             | 46                             | 16              | 1 300                   | 750                      |
| 698                 | 952   | 6     | 965                | 2 160             | 46                             | 16              | 1 300                   | 750                      |
| 724,6               | 855,4 | 3     | 355                | 735               | 16,1                           | 15,6            | 1 400                   | 600                      |
| 724,6               | 855,4 | 3     | 465                | 980               | 20                             | 15,9            | 1 400                   | 720                      |
| 724,6               | 855,4 | 3     | 465                | 980               | 20                             | 15,9            | 1 400                   | 720                      |
| 728                 | 932   | 4     | 530                | 1 160             | 24,1                           | 16              | 1 300                   | 630                      |
| 733                 | 927   | 5     | 680                | 1 530             | 30                             | 16,3            | 1 300                   | 730                      |
| 733                 | 927   | 5     | 680                | 1 530             | 30                             | 16,3            | 1 300                   | 730                      |
| 733                 | 927   | 5     | 680                | 1 530             | 30                             | 16,3            | 1 300                   | 730                      |
| 733                 | 927   | 5     | 680                | 1 530             | 30                             | 16,3            | 1 300                   | 730                      |
| 738                 | 972   | 6     | 930                | 2 200             | 44,5                           | 16,3            | 1 300                   | –                        |
| 733                 | 1 007 | 5     | 710                | 1 600             | 30,5                           | 16,3            | 1 300                   | 670                      |
| 738                 | 1 002 | 6     | 1 020              | 2 320             | 48                             | 16              | 1 200                   | 700                      |
| 738                 | 1 002 | 6     | 1 020              | 2 320             | 48                             | 16              | 1 200                   | 700                      |
| 738                 | 1 002 | 6     | 1 020              | 2 320             | 48                             | 16              | 1 200                   | –                        |
| 785                 | 1 005 | 7,5   | 1 140              | 2 700             | 55                             | 15,8            | 1 200                   | –                        |
| 764,6               | 905,4 | 3     | 380                | 830               | 17,2                           | 15,6            | 1 300                   | 560                      |
| 768                 | 902   | 4     | 510                | 1 120             | 22,6                           | 15,9            | 1 300                   | 680                      |
| 768                 | 902   | 4     | 510                | 1 120             | 22,6                           | 15,9            | 1 300                   | 680                      |
| 773                 | 977   | 5     | 585                | 1 340             | 26                             | 16              | 1 300                   | 600                      |
| 773                 | 977   | 5     | 720                | 1 660             | 32,5                           | 16,3            | 1 300                   | 690                      |
| 773                 | 977   | 5     | 720                | 1 660             | 32,5                           | 16,3            | 1 300                   | 690                      |
| 773                 | 977   | 5     | 720                | 1 660             | 32,5                           | 16,3            | 1 300                   | 690                      |
| 773                 | 977   | 5     | 720                | 1 660             | 32,5                           | 16,3            | 1 300                   | 690                      |

# Deep groove ball bearings

Single row



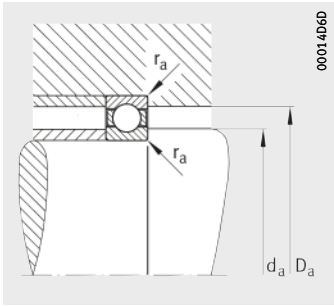
With retaining slot

Dimension table (continued) · Dimensions in mm

| Designation               | Mass<br>m<br>≈kg | Dimensions |       |     |           |                     |                     |
|---------------------------|------------------|------------|-------|-----|-----------|---------------------|---------------------|
|                           |                  | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| Z-565323.KL <sup>1)</sup> | 312              | <b>750</b> | 1 016 | 125 | 6         | 933,8               | 839,3               |
| 160/750-M                 | 362              | <b>750</b> | 1 090 | 109 | 7,5       | 966,5               | 876                 |
| 60/750-M                  | 469              | <b>750</b> | 1 090 | 150 | 7,5       | 985,3               | 858,4               |
| 60/750-MB-C3              | 469              | <b>750</b> | 1 090 | 150 | 7,5       | 985,3               | 858,4               |
| Z-500909.KL <sup>1)</sup> | 451              | <b>760</b> | 1 080 | 150 | 7,5       | 984,5               | 858                 |
| F-800886.KL               | 120              | <b>769</b> | 940   | 78  | 5         | 885,5               | 827,2               |
| Z-556478.KL               | 61,4             | <b>800</b> | 935   | 50  | 5         | 886,5               | 849,5               |
| 608/800-M                 | 101              | <b>800</b> | 980   | 57  | 4         | 914,1               | 867,2               |
| 618/800-M                 | 136              | <b>800</b> | 980   | 82  | 5         | 921,8               | 860                 |
| 618/800-MA                | 136              | <b>800</b> | 980   | 82  | 5         | 923,5               | 860                 |
| 609/800-M                 | 212              | <b>800</b> | 1 060 | 82  | 6         | 965                 | 898                 |
| 619/800-M                 | 283              | <b>800</b> | 1 060 | 115 | 6         | 976,7               | 886,2               |
| 619/800-MB                | 283              | <b>800</b> | 1 060 | 115 | 6         | 976,7               | 886,2               |
| 619/800-MB-C3             | 283              | <b>800</b> | 1 060 | 115 | 6         | 976,7               | 886,2               |
| Z-526190.KL               | 313              | <b>800</b> | 1 080 | 115 | 6         | 989                 | 891                 |
| 160/800-M                 | 403              | <b>800</b> | 1 150 | 112 | 7,5       | 1 024               | 929                 |
| 60/800-M                  | 532              | <b>800</b> | 1 150 | 155 | 7,5       | 1 038,2             | 911,5               |
| 60/800-MB-C3              | 532              | <b>800</b> | 1 150 | 155 | 7,5       | 1 038,2             | 911,5               |
| F-801911.KL <sup>1)</sup> | 538              | <b>800</b> | 1 150 | 155 | 7,5       | 1 038               | 910                 |
| Z-572323.KL               | 278              | <b>830</b> | 1 080 | 115 | 6         | 1 003,8             | 909,3               |
| 608/850-M                 | 106              | <b>850</b> | 1 030 | 57  | 4         | 966,2               | 915,4               |
| 618/850-M                 | 144              | <b>850</b> | 1 030 | 82  | 5         | 971,9               | 910                 |
| 618/850-MA                | 144              | <b>850</b> | 1 030 | 82  | 5         | 973,5               | 910                 |
| 609/850-M                 | 241              | <b>850</b> | 1 120 | 85  | 6         | 1 023               | 950                 |
| 619/850-M                 | 323              | <b>850</b> | 1 120 | 118 | 6         | 1 033,6             | 939,2               |
| 619/850-MB                | 323              | <b>850</b> | 1 120 | 118 | 6         | 1 033,6             | 939,2               |
| 619/850-MB-C3             | 323              | <b>850</b> | 1 120 | 118 | 6         | 1 033,6             | 939,2               |
| 160/850-M                 | 476              | <b>850</b> | 1 220 | 118 | 7,5       | 1 086,5             | 987                 |
| 60/850-M                  | 626              | <b>850</b> | 1 220 | 165 | 7,5       | 1 105,9             | 968,1               |
| 60/850-MB-C3              | 626              | <b>850</b> | 1 220 | 165 | 7,5       | 1 105,9             | 968,1               |
| Z-501657.KL <sup>2)</sup> | 642              | <b>850</b> | 1 220 | 165 | 7,5       | 1 105,9             | 966,8               |
| Z-529055.KL <sup>1)</sup> | 337              | <b>860</b> | 1 130 | 120 | 7,5       | 1 044               | 945,5               |

<sup>1)</sup> With retaining slot.

<sup>2)</sup> With retaining slot; radial internal clearance 200...300 μm.

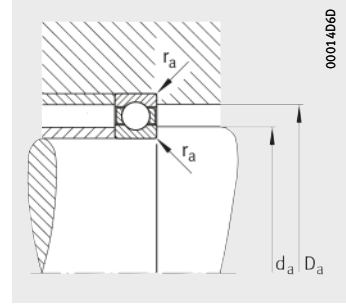
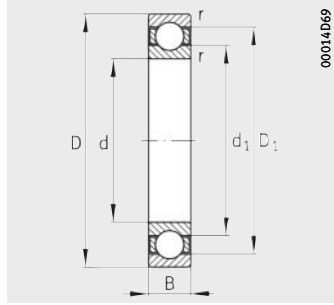


Mounting dimensions

| Mounting dimensions |         |       | Basic load ratings |                   | Fatigue limit load<br>$C_{ur}$ | Factor<br>$f_0$ | Limiting speed<br>$n_G$ | Reference speed<br>$n_B$ |
|---------------------|---------|-------|--------------------|-------------------|--------------------------------|-----------------|-------------------------|--------------------------|
| $d_a$               | $D_a$   | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ |                                |                 |                         |                          |
| min.                | max.    | max.  | kN                 | kN                | kN                             |                 | $\text{min}^{-1}$       | $\text{min}^{-1}$        |
| 773                 | 993     | 5     | 830                | 2 000             | 38                             | 16,4            | 1 300                   | –                        |
| 778                 | 1 062   | 6     | 750                | 1 730             | 32                             | 16,3            | 1 200                   | 640                      |
| 778                 | 1 062   | 6     | 1 100              | 2 650             | 52                             | 16              | 1 100                   | 670                      |
| 778                 | 1 062   | 6     | 1 100              | 2 650             | 52                             | 16              | 1 100                   | 670                      |
| 788                 | 1 052   | 6     | 1 080              | 2 600             | 49,5                           | 16,1            | 1 100                   | –                        |
| 787                 | 922     | 4     | 510                | 1 140             | 23,1                           | 15,8            | 1 300                   | –                        |
| 818                 | 917     | 4     | 305                | 670               | 14,7                           | 15,4            | 1 300                   | –                        |
| 814,6               | 965,4   | 3     | 430                | 980               | 19,7                           | 15,6            | 1 300                   | 530                      |
| 818                 | 962     | 4     | 550                | 1 270             | 23,8                           | 15,8            | 1 300                   | 630                      |
| 818                 | 962     | 4     | 550                | 1 270             | 23,8                           | 15,8            | 1 300                   | 630                      |
| 823                 | 1 037   | 5     | 610                | 1 430             | 27                             | 15,9            | 1 200                   | 560                      |
| 823                 | 1 037   | 5     | 800                | 1 900             | 34,5                           | 16,3            | 1 200                   | 630                      |
| 823                 | 1 037   | 5     | 800                | 1 900             | 34,5                           | 16,3            | 1 200                   | 630                      |
| 823                 | 1 037   | 5     | 800                | 1 900             | 34,5                           | 16,3            | 1 200                   | 630                      |
| 823                 | 1 057   | 5     | 865                | 2 080             | 38,5                           | 16,4            | 1 100                   | –                        |
| 828                 | 1 122   | 6     | 815                | 2 000             | 35,5                           | 16,3            | 1 100                   | 590                      |
| 828                 | 1 122   | 6     | 1 140              | 2 800             | 55                             | 16,1            | 1 100                   | 630                      |
| 828                 | 1 122   | 6     | 1 140              | 2 800             | 55                             | 16,1            | 1 100                   | 630                      |
| 828                 | 1 122   | 6     | 1 140              | 2 800             | 55                             | 16,1            | 1 100                   | –                        |
| 853                 | 1 057   | 5     | 850                | 2 080             | 38                             | 16,3            | 1 100                   | –                        |
| 864,6               | 1 015,4 | 3     | 430                | 1 000             | 18,4                           | 15,5            | 1 200                   | 480                      |
| 868                 | 1 012   | 4     | 560                | 1 290             | 23,9                           | 15,8            | 1 200                   | 580                      |
| 868                 | 1 012   | 4     | 560                | 1 290             | 23,9                           | 15,8            | 1 200                   | 580                      |
| 873                 | 1 097   | 5     | 670                | 1 630             | 27                             | 15,9            | 1 100                   | 530                      |
| 873                 | 1 097   | 5     | 850                | 2 080             | 37                             | 16,2            | 1 100                   | 590                      |
| 873                 | 1 097   | 5     | 850                | 2 080             | 37                             | 16,2            | 1 100                   | 590                      |
| 873                 | 1 097   | 5     | 850                | 2 080             | 37                             | 16,2            | 1 100                   | 590                      |
| 878                 | 1 192   | 6     | 865                | 2 200             | 38,5                           | 16,2            | 1 100                   | 550                      |
| 878                 | 1 192   | 6     | 1 220              | 3 150             | 57                             | 16,2            | 1 000                   | 600                      |
| 878                 | 1 192   | 6     | 1 220              | 3 150             | 57                             | 16,2            | 1 000                   | 600                      |
| 878                 | 1 192   | 6     | 1 220              | 3 150             | 57                             | 16,2            | 1 000                   | –                        |
| 888                 | 1 102   | 6     | 930                | 2 360             | 50                             | 16,4            | 1 100                   | –                        |

# Deep groove ball bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

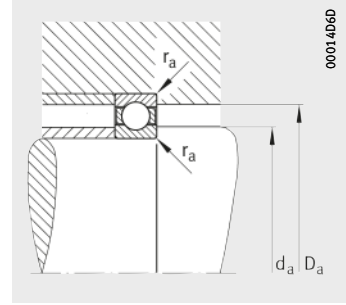
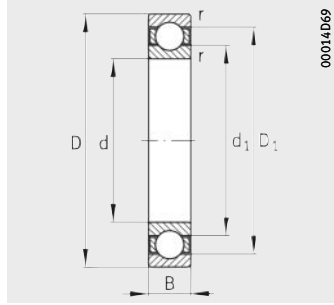
| Designation | Mass<br>m<br>≈kg | Dimensions |       |     |           |                     |                     |
|-------------|------------------|------------|-------|-----|-----------|---------------------|---------------------|
|             |                  | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| 608/900-M   | 115              | 900        | 1 090 | 60  | 5         | 1 022               | 970                 |
| 618/900-M   | 169              | 900        | 1 090 | 85  | 5         | 1 024,8             | 965,9               |
| 609/900-M   | 280              | 900        | 1 180 | 88  | 6         | 1 078,1             | 1 002               |
| 619/900-M   | 352              | 900        | 1 180 | 122 | 6         | 1 090,5             | 991,5               |
| 160/900-M   | 532              | 900        | 1 280 | 122 | 7,5       | 1 143               | 1 040,5             |
| 60/900-M    | 705              | 900        | 1 280 | 170 | 7,5       | 1 161,1             | 1 022,5             |
| 608/950-M   | 141              | 950        | 1 150 | 63  | 5         | 1 079               | 1 023               |
| 618/950-M   | 198              | 950        | 1 150 | 90  | 5         | 1 082,9             | 1 017,7             |
| F-807431.KL | 259              | 950        | 1 200 | 90  | 5         | 1 085,6             | 1 014,6             |
| 609/950-M   | 335              | 950        | 1 250 | 95  | 6         | 1 141               | 1 061               |
| 619/950-M   | 443              | 950        | 1 250 | 132 | 7,5       | 1 152,2             | 1 050,7             |
| Z-532248.KL | 722              | 950        | 1 320 | 170 | 10        | 1 208               | 1 066               |
| 160/950-M   | 658              | 950        | 1 360 | 132 | 7,5       | 1 212               | 1 101,5             |
| 60/950-M    | 856              | 950        | 1 360 | 180 | 7,5       | 1 236               | 1 078,5             |
| 608/1000-M  | 192              | 1 000      | 1 220 | 71  | 5         | 1 140,5             | 1 081               |
| 618/1000-M  | 254              | 1 000      | 1 220 | 100 | 6         | 1 147,8             | 1 073,3             |
| 618/1000-MA | 256              | 1 000      | 1 220 | 100 | 6         | 1 150               | 1 073,3             |
| 609/1000-M  | 407              | 1 000      | 1 320 | 103 | 6         | 1 204               | 1 120               |
| 619/1000-M  | 531              | 1 000      | 1 320 | 140 | 7,5       | 1 220,7             | 1 102,4             |
| F-804593.KL | 594              | 1 000      | 1 380 | 122 | 6         | 1 240,6             | 1 142,1             |
| Z-528268.KL | 657              | 1 000      | 1 380 | 180 | 7,5       | 1 263               | 1 121,5             |
| 160/1000-M  | 726              | 1 000      | 1 420 | 136 | 7,5       | 1 279               | 1 164,5             |
| 60/1000-M   | 944              | 1 000      | 1 420 | 185 | 7,5       | 1 291               | 1 133,5             |
| Z-529852.KL | 263              | 1 030      | 1 250 | 100 | 5         | 1 180               | 1 102               |
| 608/1060-M  | 202              | 1 060      | 1 280 | 71  | 5         | 1 200,5             | 1 141               |
| 618/1060-M  | 269              | 1 060      | 1 280 | 100 | 6         | 1 207,5             | 1 133,7             |
| 618/1060-MA | 270              | 1 060      | 1 280 | 100 | 6         | 1 210               | 1 133,7             |
| 609/1060-M  | 485              | 1 060      | 1 400 | 109 | 7,5       | 1 278               | 1 186               |
| 619/1060-M  | 640              | 1 060      | 1 400 | 150 | 7,5       | 1 289,9             | 1 172,9             |
| 160/1060-M  | 834              | 1 060      | 1 500 | 140 | 9,5       | 1 343,5             | 1 221               |
| 60/1060-M   | 1 100            | 1 060      | 1 500 | 195 | 9,5       | 1 365               | 1 200               |



| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Factor<br>$f_0$ | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-----------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |                 |  |   |
| 918                 | 1072          | 4             | 480                 | 1 180                   | 22,7                                 | 15,5            | 1 100  | 450   |
| 918                 | 1072          | 4             | 570                 | 1 370                   | 27                                   | 15,7            | 1 100  | 550   |
| 923                 | 1 157         | 5             | 720                 | 1 800                   | 33                                   | 15,9            | 1 100  | 480   |
| 923                 | 1 157         | 5             | 900                 | 2 280                   | 50                                   | 16,2            | 1 000  | 550   |
| 928                 | 1 252         | 6             | 900                 | 2 320                   | 40                                   | 16,2            | 1 000  | 520   |
| 928                 | 1 252         | 6             | 1 290               | 3 400                   | 60                                   | 16,3            | 950  | 560   |
| 968                 | 1 132         | 4             | 520                 | 1 290                   | 23,8                                 | 15,5            | 1 100  | 430   |
| 968                 | 1 132         | 4             | 655                 | 1 660                   | 30,5                                 | 15,8            | 1 100  | 510   |
| 968                 | 1 182         | 4             | 655                 | 1 660                   | 29                                   | 15,8            | 1 100  | –   |
| 973                 | 1 227         | 5             | 780                 | 2 040                   | 37                                   | 15,9            | 1 000  | 450   |
| 978                 | 1 222         | 6             | 965                 | 2 550                   | 43,5                                 | 16,2            | 950  | 520   |
| 986                 | 1 284         | 8             | 1 320               | 3 650                   | 44                                   | 16,4            | 900  | –   |
| 978                 | 1 332         | 6             | 1 000               | 2 700                   | 45,5                                 | 16,2            | 950  | 490   |
| 978                 | 1 332         | 6             | 1 430               | 3 900                   | 68                                   | 16,1            | 900  | 530   |
| 1 018               | 1 202         | 4             | 585                 | 1 500                   | 27,5                                 | 15,6            | 1 000  | 430   |
| 1 023               | 1 197         | 5             | 735                 | 1 930                   | 34                                   | 15,8            | 1 000  | 495   |
| 1 023               | 1 197         | 5             | 735                 | 1 930                   | 34                                   | 15,8            | 1 000  | 495   |
| 1 028               | 1 292         | 6             | 830                 | 2 240                   | 40                                   | 15,9            | 950  | 450   |
| 1 028               | 1 292         | 6             | 1 160               | 3 250                   | 54                                   | 16,3            | 900  | 485   |
| 1 023               | 1 357         | 5             | 950                 | 2 550                   | 42,5                                 | 16              | 900  | –   |
| 1 028               | 1 352         | 6             | 1 370               | 3 900                   | 64                                   | 16,4            | 900  | –   |
| 1 028               | 1 392         | 6             | 1 060               | 2 900                   | 47                                   | 16,2            | 900  | 455   |
| 1 028               | 1 392         | 6             | 1 500               | 4 150                   | 70                                   | 16,3            | 850  | 500   |
| 1 048               | 1 232         | 4             | 720                 | 1 860                   | 31,5                                 | 15,8            | 950  | –   |
| 1 078               | 1 262         | 4             | 585                 | 1 500                   | 27,5                                 | 15,6            | 950  | 380   |
| 1 083               | 1 257         | 5             | 765                 | 2 040                   | 35,5                                 | 15,8            | 950  | 460   |
| 1 083               | 1 257         | 5             | 765                 | 2 040                   | 35,5                                 | 15,8            | 950  | 460   |
| 1 088               | 1 372         | 6             | 930                 | 2 600                   | 44                                   | 15,9            | 900  | 400   |
| 1 088               | 1 372         | 6             | 1 140               | 3 250                   | 52                                   | 16,2            | 850  | 465   |
| 1 094               | 1 466         | 8             | 1 160               | 3 350                   | 53                                   | 16,2            | 850  | 430   |
| 1 094               | 1 466         | 8             | 1 600               | 4 650                   | 76                                   | 16,3            | 800  | 450   |

# Deep groove ball bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

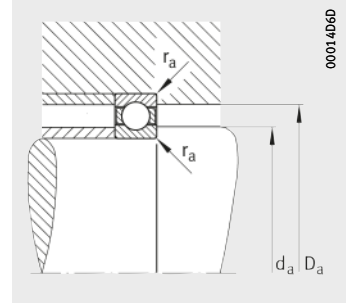
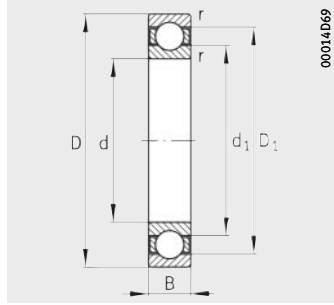
| Designation        | Mass<br>m<br>≈kg | Dimensions   |       |     |           |                     |                     |
|--------------------|------------------|--------------|-------|-----|-----------|---------------------|---------------------|
|                    |                  | d            | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| <b>608/1120-M</b>  | 259              | <b>1 120</b> | 1 360 | 78  | 5         | 1 274               | 1 209               |
| <b>618/1120-M</b>  | 329              | <b>1 120</b> | 1 360 | 106 | 6         | 1 281,1             | 1 200,8             |
| <b>618/1120-MA</b> | 337              | <b>1 120</b> | 1 360 | 106 | 6         | 1 284               | 1 200,8             |
| <b>609/1120-M</b>  | 509              | <b>1 120</b> | 1 460 | 109 | 7,5       | 1 338               | 1 246               |
| <b>619/1120-M</b>  | 661              | <b>1 120</b> | 1 460 | 150 | 7,5       | 1 349               | 1 235               |
| <b>160/1120-M</b>  | 954              | <b>1 120</b> | 1 580 | 145 | 9,5       | 1 415               | 1 289               |
| <b>60/1120-M</b>   | 1 250            | <b>1 120</b> | 1 580 | 200 | 9,5       | 1 439               | 1 266               |
| <b>608/1180-M</b>  | 259              | <b>1 180</b> | 1 420 | 78  | 5         | 1 334               | 1 269               |
| <b>618/1180-M</b>  | 357              | <b>1 180</b> | 1 420 | 106 | 6         | 1 341,7             | 1 258,7             |
| <b>618/1180-MA</b> | 377              | <b>1 180</b> | 1 420 | 106 | 6         | 1 344               | 1 258,7             |
| <b>609/1180-M</b>  | 600              | <b>1 180</b> | 1 540 | 115 | 7,5       | 1 411               | 1 312               |
| <b>619/1180-M</b>  | 797              | <b>1 180</b> | 1 540 | 160 | 7,5       | 1 423               | 1 301               |
| <b>160/1180-M</b>  | 1 110            | <b>1 180</b> | 1 660 | 155 | 9,5       | 1 489,5             | 1 355               |
| <b>60/1180-M</b>   | 1 450            | <b>1 180</b> | 1 660 | 212 | 9,5       | 1 512               | 1 332               |
| <b>608/1250-M</b>  | 293              | <b>1 250</b> | 1 500 | 80  | 6         | 1 409,5             | 1 343               |
| <b>618/1250-M</b>  | 401              | <b>1 250</b> | 1 500 | 112 | 6         | 1 418,8             | 1 333,9             |
| <b>618/1250-MA</b> | 401              | <b>1 250</b> | 1 500 | 112 | 6         | 1 421,1             | 1 333,9             |
| <b>609/1250-M</b>  | 711              | <b>1 250</b> | 1 630 | 122 | 7,5       | 1 493               | 1 391               |
| <b>619/1250-M</b>  | 933              | <b>1 250</b> | 1 630 | 170 | 7,5       | 1 507               | 1 377               |
| <b>60/1250-M</b>   | 1 650            | <b>1 250</b> | 1 750 | 218 | 9,5       | 1 598               | 1 408               |
| <b>608/1320-M</b>  | 399              | <b>1 320</b> | 1 600 | 88  | 6         | 1 498,5             | 1 424               |
| <b>618/1320-M</b>  | 523              | <b>1 320</b> | 1 600 | 122 | 6         | 1 504,7             | 1 416,9             |
| <b>618/1320-MA</b> | 525              | <b>1 320</b> | 1 600 | 122 | 6         | 1 508               | 1 416,9             |
| <b>609/1320-M</b>  | 830              | <b>1 320</b> | 1 720 | 128 | 7,5       | 1 576               | 1 468               |
| <b>619/1320-M</b>  | 1 070            | <b>1 320</b> | 1 720 | 175 | 7,5       | 1 590               | 1 454               |
| <b>60/1320-M</b>   | 1 950            | <b>1 320</b> | 1 850 | 230 | 12        | 1 686               | 1 488               |
| <b>608/1400-M</b>  | 472              | <b>1 400</b> | 1 700 | 95  | 6         | 1 591,5             | 1 511               |
| <b>618/1400-M</b>  | 640              | <b>1 400</b> | 1 700 | 132 | 7,5       | 1 602               | 1 501,1             |
| <b>618/1400-MA</b> | 643              | <b>1 400</b> | 1 700 | 132 | 7,5       | 1 604,5             | 1 501,1             |
| <b>619/1400-M</b>  | 1 260            | <b>1 400</b> | 1 820 | 185 | 9,5       | 1 684               | 1 540               |
| <b>60/1400-M</b>   | 2 250            | <b>1 400</b> | 1 950 | 243 | 12        | 1 784               | 1 573               |



| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Factor<br>$f_0$ | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-----------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |                 |  |   |
| 1 138               | 1 342         | 4             | 670                 | 1 830                   | 31,5                                 | 15,5            | 900  | 360   |
| 1 143               | 1 337         | 5             | 815                 | 2 240                   | 36                                   | 15,8            | 900  | 430   |
| 1 143               | 1 337         | 5             | 815                 | 2 240                   | 36                                   | 15,8            | 900  | 430   |
| 1 148               | 1 432         | 6             | 950                 | 2 650                   | 45                                   | 15,9            | 850  | 380   |
| 1 148               | 1 432         | 6             | 1 160               | 3 400                   | 53                                   | 16,2            | 800  | 435   |
| 1 154               | 1 546         | 8             | 1 220               | 3 550                   | 54                                   | 16,2            | 800  | 405   |
| 1 154               | 1 546         | 8             | 1 760               | 5 400                   | 87                                   | 16,3            | 750  | 430   |
| 1 198               | 1 402         | 4             | 670                 | 1 930                   | 33                                   | 15,5            | 850  | 340   |
| 1 203               | 1 397         | 5             | 830                 | 2 360                   | 37,5                                 | 15,7            | 850  | 405   |
| 1 203               | 1 397         | 5             | 830                 | 2 360                   | 37,5                                 | 15,7            | 850  | 405   |
| 1 208               | 1 512         | 6             | 1 060               | 3 150                   | 50                                   | 15,9            | 800  | 360   |
| 1 208               | 1 512         | 6             | 1 290               | 3 800                   | 60                                   | 16,2            | 750  | 410   |
| 1 214               | 1 626         | 8             | 1 320               | 4 000                   | 61                                   | 16,2            | 750  | 380   |
| 1 214               | 1 626         | 8             | 1 860               | 5 850                   | 90                                   | 16,3            | 700  | 400   |
| 1 273               | 1 477         | 5             | 710                 | 2 080                   | 34                                   | 15,5            | 800  | 320   |
| 1 273               | 1 477         | 5             | 900                 | 2 600                   | 39,5                                 | 15,7            | 800  | 380   |
| 1 273               | 1 477         | 5             | 900                 | 2 600                   | 39,5                                 | 15,7            | 800  | 380   |
| 1 278               | 1 602         | 6             | 1 100               | 3 350                   | 53                                   | 15,9            | 750  | 340   |
| 1 278               | 1 602         | 6             | 1 400               | 4 300                   | 67                                   | 16,2            | 700  | 385   |
| 1 284               | 1 716         | 8             | 2 000               | 6 400                   | 96                                   | 16,4            | 670  | 380   |
| 1 343               | 1 577         | 5             | 815                 | 2 500                   | 40                                   | 15,5            | 750  | 300   |
| 1 343               | 1 577         | 5             | 950                 | 2 850                   | 45,5                                 | 15,7            | 750  | 360   |
| 1 343               | 1 577         | 5             | 950                 | 2 850                   | 45,5                                 | 15,7            | 750  | 360   |
| 1 348               | 1 692         | 6             | 1 200               | 3 750                   | 57                                   | 15,9            | 700  | 320   |
| 1 348               | 1 692         | 6             | 1 530               | 4 900                   | 71                                   | 16,2            | 700  | 360   |
| 1 362               | 1 808         | 10            | 2 120               | 7 100                   | 104                                  | 16,4            | 670  | 360   |
| 1 423               | 1 677         | 5             | 900                 | 2 800                   | 43                                   | 15,5            | 700  | 280   |
| 1 428               | 1 672         | 6             | 1 040               | 3 200                   | 46,5                                 | 15,8            | 700  | 340   |
| 1 428               | 1 672         | 6             | 1 040               | 3 200                   | 46,5                                 | 15,8            | 700  | 340   |
| 1 434               | 1 786         | 8             | 1 630               | 5 400                   | 80                                   | 16,2            | 670  | 335   |
| 1 442               | 1 908         | 10            | 2 320               | 8 000                   | 114                                  | 16,4            | 630  | 340   |

# Deep groove ball bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

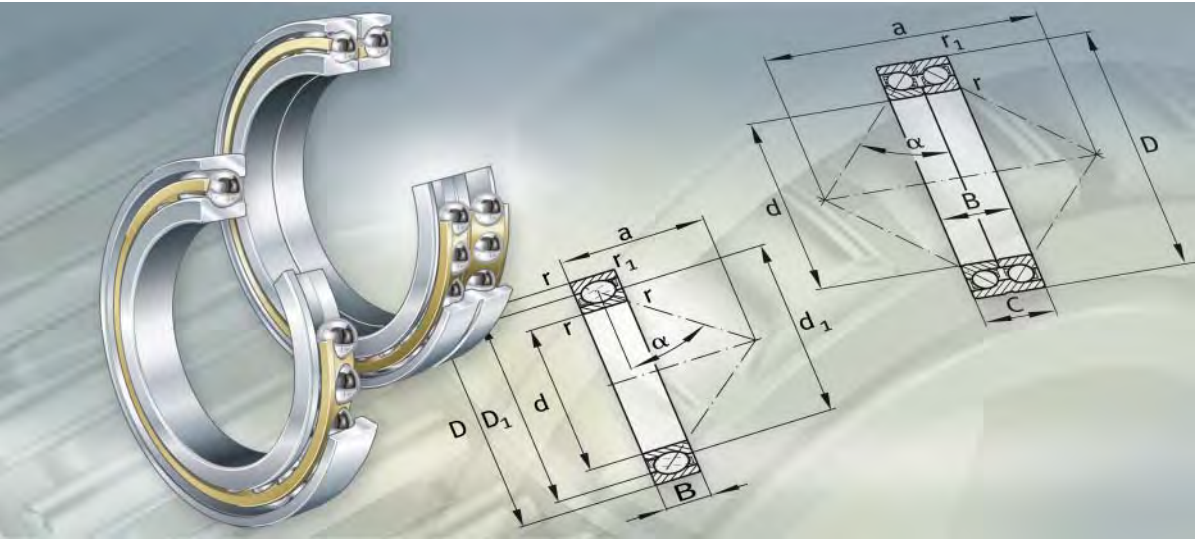
| Designation | Mass<br>m<br>≈kg | Dimensions   |       |     |           |                     |                     |
|-------------|------------------|--------------|-------|-----|-----------|---------------------|---------------------|
|             |                  | d            | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ |
| Z-563867.KL | 419              | <b>1 500</b> | 1 750 | 100 | 6         | 1 663               | 1 589               |
| Z-547707.KL | 696              | <b>1 500</b> | 1 820 | 125 | 7,5       | 1 715               | 1 606,5             |
| 618/1500-M  | 778              | <b>1 500</b> | 1 820 | 140 | 7,5       | 1 715,1             | 1 608,1             |
| 618/1500-MA | 792              | <b>1 500</b> | 1 820 | 140 | 7,5       | 1 718,7             | 1 608,1             |
| 619/1500-M  | 1 530            | <b>1 500</b> | 1 950 | 195 | 9,5       | 1 805               | 1 650               |
| 60/1500-M   | 3 070            | <b>1 500</b> | 2 120 | 272 | 12        | 1 932               | 1 696               |
| 619/1600-M  | 1 690            | <b>1 600</b> | 2 060 | 200 | 9,5       | 1 914               | 1 752               |
| 60/1600-M   | 3 460            | <b>1 600</b> | 2 240 | 280 | 12        | 2 045               | 1 803               |
| 619/1700-M  | 1 980            | <b>1 700</b> | 2 180 | 212 | 9,5       | 2 027               | 1 859               |
| F-809025.KL | 1 960            | <b>1 700</b> | 2 180 | 212 | 7,5       | 2 036               | 1 847               |
| 60/1700-M   | 3 900            | <b>1 700</b> | 2 360 | 290 | 15        | 2 158               | 1 910               |
| 619/1800-M  | 2 250            | <b>1 800</b> | 2 300 | 218 | 9,5       | 2 144,9             | 1 960,5             |
| 60/1800-M   | 4 660            | <b>1 800</b> | 2 500 | 308 | 15        | 2 292               | 2 018               |
| 619/1900-M  | 2 660            | <b>1 900</b> | 2 430 | 230 | 12        | 2 265               | 2 072               |
| Z-541682.KL | 1 440            | <b>2 000</b> | 2 360 | 190 | 9,5       | 2 260               | 2 120               |





| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Factor<br>$f_0$ | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-----------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |                 |  |   |
| 1 523               | 1 727         | 5             | 510                 | 1 290                   | 20,6                                 | 15,4            | 670  | –   |
| 1 528               | 1 792         | 6             | 1 160               | 3 750                   | 55                                   | 15,8            | 670  | –   |
| 1 528               | 1 792         | 6             | 1 160               | 3 750                   | 55                                   | 15,8            | 670  | 315   |
| 1 528               | 1 792         | 6             | 1 160               | 3 750                   | 55                                   | 15,8            | 670  | 315   |
| 1 534               | 1 916         | 8             | 1 830               | 6 300                   | 87                                   | 16,2            | 630  | 310   |
| 1 542               | 2 078         | 10            | 2 600               | 9 300                   | 130                                  | 16,3            | 600  | 300   |
| 1 634               | 2 026         | 8             | 1 900               | 6 800                   | 95                                   | 16,2            | 600  | 285   |
| 1 642               | 2 198         | 10            | 2 800               | 10 600                  | 140                                  | 16,4            | 560  | 280   |
| 1 734               | 2 146         | 8             | 2 000               | 7 350                   | 94                                   | 16,1            | 560  | 270   |
| 1 728               | 2 152         | 6             | 2 160               | 8 000                   | 104                                  | 16,2            | 560  | 260   |
| 1 750               | 2 310         | 12            | 2 900               | 11 200                  | 147                                  | 16,4            | 530  | 260   |
| 1 842               | 2 258         | 10            | 2 200               | 8 300                   | 105                                  | 16,2            | 560  | 249   |
| 1 850               | 2 450         | 12            | 3 350               | 13 400                  | 167                                  | 16,3            | 530  | 240   |
| 1 942               | 2 388         | 10            | 2 400               | 9 500                   | 118                                  | 16,2            | 530  | 233   |
| 2 034               | 2 326         | 8             | 1 460               | 5 600                   | 61                                   | 15,6            | 530  | –   |





## Angular contact ball bearings

Single row  
Double row

# Angular contact ball bearings

## **Single row angular contact ball bearings** ..... 220

In single row angular contact ball bearings, the raceways are arranged such that the forces are transmitted from one raceway to the other at a specific contact angle (oblique to the radial plane).

The axial load carrying capacity increases with the contact angle. Due to the large contact angle, single row angular contact ball bearings are more suitable than deep groove ball bearings for supporting large axial forces acting in one direction.

Single row angular contact ball bearings can support radial loads and unilateral axial loads. They are adjusted against a second bearing that provides counter guidance.

Single row angular contact ball bearings with standardised main dimensions and standardised designations to DIN 628-1 are used, for example, in gearboxes, rolling mills and electrical machinery.

Special bearings with non-standardised designations (Z-5..SKL or F-8..SKL) and main dimensions are also available.

Such bearings with an extended inner ring are used, for example, as axial bearings for oil film bearings.

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## **Double row angular contact ball bearings** ..... 248

Double row angular contact ball bearings are similar in design to a pair of single row angular contact ball bearings in an O arrangement or an X arrangement. In this case, the apexes of the cones formed by the ball contact lines point outwards or inwards.

Double row bearings can support radial forces as well as axial forces in both directions and are particularly suitable for rigid axial guidance arrangements.

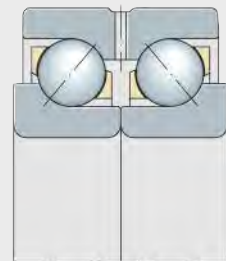
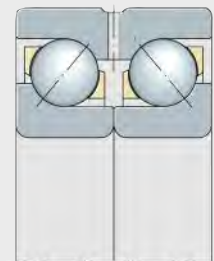
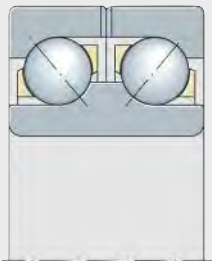
All the double row angular contact ball bearings described here are special bearings with non-standardised main dimensions and designations (Z-5..SKL).

Bearings with a split outer ring (X arrangement) or a split inner ring (O arrangement) are used, for example, as axial bearings in wire rolling mills.

Bearings in an O arrangement with an extended inner ring are frequently used as axial bearings for oil film bearings.

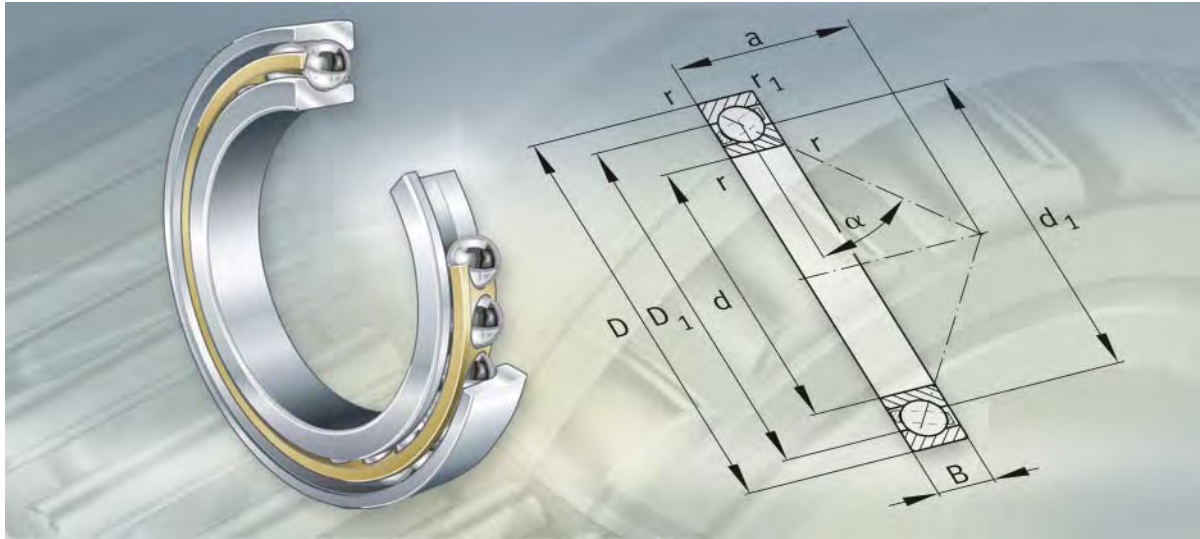


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**FAG**



**Single row angular contact ball bearings**

# Single row angular contact ball bearings

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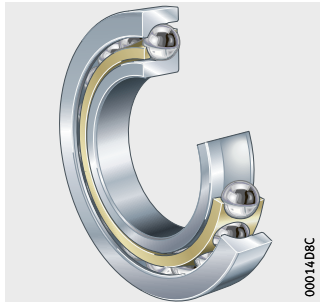
# Product overview Single row angular contact ball bearings

## Single row

Contact angle  $\alpha = 40^\circ$

Contact angle  $\alpha = 30^\circ$

70..-B, 72..-B, 73..-B,  
Z-5..SKL1-01, F-8..SKL1-01



708, 709, 718, 719, 70,  
Z-5..SKL1-02, F-8..SKL1-02



With extended inner ring

Contact angle  $\alpha = 40^\circ$

Z-5..SKL1-03





# Single row angular contact ball bearings

**Features** Single row angular contact ball bearings are, with a few exceptions, self-retaining units with solid inner and outer rings and ball and cage assemblies with cages. The raceways of the inner and outer rings are offset from each other along the bearing axis. The angular adjustment facility of these bearings is very limited.

**Radial and axial load capacity** Single row angular contact ball bearings can support axial forces in one direction and high radial forces. They must be axially adjusted against a second bearing mounted in a mirror image arrangement. The axial load carrying capacity is dependent on the contact angle. Bearings with a contact angle  $40^\circ$  have a higher axial load carrying capacity than those with a contact angle  $30^\circ$ .

**Universal design** Single row angular contact ball bearings of the universal design have the suffix UA, UL or UO and are intended for mounting in pairs in an X, O or tandem arrangement or mounting in groups. These bearings can be mounted in any arrangement required.

The suffix UA indicates slight axial internal clearance, the suffix UL indicates slight preload and the suffix UO indicates freedom from clearance in an X or O arrangement.

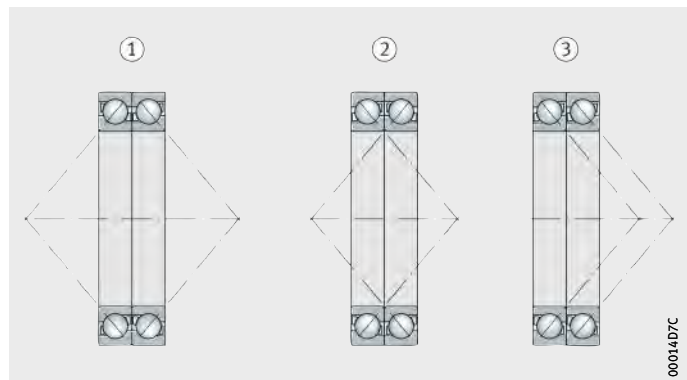
When ordering bearings, the total quantity of bearings must be stated, not the number of bearing pairs or bearing groups.

**Matched bearings** Sets without an intermediate ring are available in an O arrangement (DB), X arrangement (DF) or tandem arrangement (DT), *Figure 1*.

When ordering bearings, the number of sets must be stated, not the number of individual bearings.

- ① O arrangement, DB
- ② X arrangement, DF
- ③ Tandem arrangement, DT

*Figure 1*  
Matched sets



# Single row angular contact ball bearings

**Sealing** The bearings are not sealed.

**Lubrication** Single row angular contact ball bearings can be lubricated with grease or oil.

**Operating temperature** Angular contact ball bearings without seals can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .

Bearings with a diameter  $D > 240\text{ mm}$  are dimensionally stable up to  $+200\text{ }^{\circ}\text{C}$ .

**Cages** Angular contact ball bearings with ball-guided solid window cages made from brass have, in the case of bearings of standardised series, the suffix MP.

The suffixes MPA or MPB(S) indicate bearings with a solid window cage made from brass that is guided on the outer ring or inner ring. In the case of bearings with non-standardised designations (Z-5..SKL or F-8..SKL), an enquiry can be placed with us for the cage design.

**Suffixes** Suffixes for the available designs of standard bearings: see table.

## Available designs

| Suffix <sup>1)</sup> | Description  | Design                                      |
|----------------------|--|---|
| B                    | Modified internal construction   | Standard                                    |
| DB                   | Two angular contact ball bearings in O arrangement, matched clearance-free                                     | Special design, available by agreement only |
| DF                   | Two angular contact ball bearings in X arrangement, matched clearance-free                                     |   |
| DT                   | Two angular contact ball bearings in tandem arrangement, matched   |   |
| MP                   | Solid brass cage   | Standard                                    |
| MPA                  | Solid brass cage, guided on outer ring   | Special design, available by agreement only |
| MPB                  | Solid brass cage, guided on inner ring   |   |
| MPBS                 | Solid brass cage, guided on inner ring, with lubrication slots   |   |
| P5                   | Bearings in tolerance class P5   |   |
| UA                   | Universal design for mounting in pairs, bearing pair has small axial internal clearance in O and X arrangement | Standard                                    |
| UL                   | Universal design for mounting in pairs, bearing pair has slight preload in O and X arrangement                 |   |
| UO                   | Universal design for mounting in pairs, bearing pair is clearance-free in O and X arrangement                  |   |

<sup>1)</sup> In the case of angular contact ball bearings with non-standardised designations, the design (for example cage, accuracy) is specified in the designation (Z-5 or F-8). In the case of these bearings, additional suffixes are only used for deviations from the original design.

## Design and safety guidelines

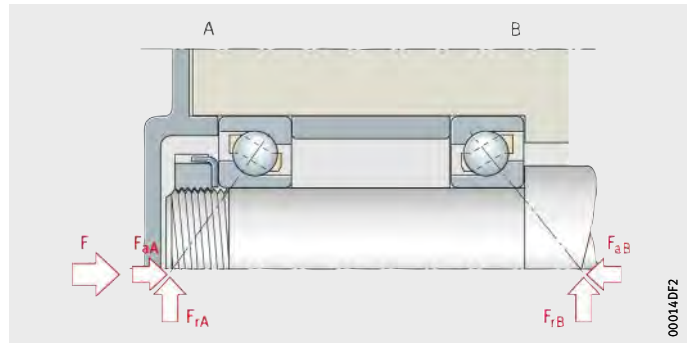
### Calculation of axial force

Under radial load, an internal axial force is induced in the bearing that must be supported by a second bearing and taken into consideration when calculating the equivalent bearing load. Depending on the bearing arrangement (O or X arrangement), the axial force must first be determined for bearings adjusted clearance-free without preload, *Figure 2*, *Figure 3* and table Load ratio and axial bearing load, page 226.

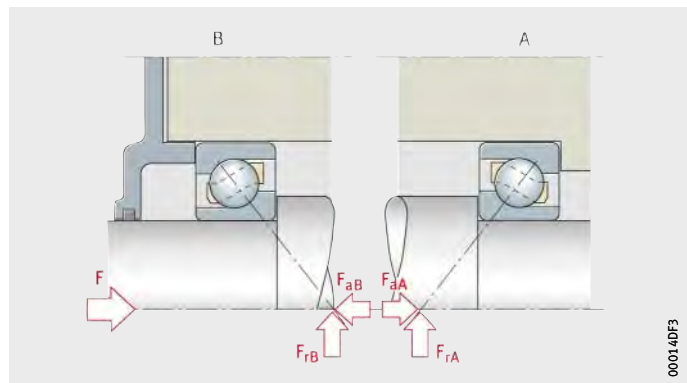
The following preconditions apply:

- The radial forces act at the central pressure points and are positive.
- Bearing A is subjected to a radial load  $F_{rA}$ , bearing B to a load  $F_{rB}$ .
- $F$  is an external axial force acting on bearing A.

*Figure 2*  
Bearings in O arrangement



*Figure 3*  
Bearings in X arrangement



# Single row angular contact ball bearings

## Load ratio and axial bearing load

| Load ratio <sup>3)</sup>                     |   | Axial force $F_a$ <sup>1)3)</sup>        |  |
|--|---|--|--|
| Radial bearing load                          | External axial force  | Bearing A                                | Bearing B                                |
| $\frac{F_{rA}}{Y_A} \leq \frac{F_{rB}}{Y_B}$ | $F \geq 0$  | $F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$ | 2)                                       |
| $\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$    | $F > 0,5 \cdot \left( \frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$    | $F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$ | 2)                                       |
|  | $F \leq 0,5 \cdot \left( \frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$ | 2)                                       | $F_a = 0,5 \cdot \frac{F_{rA}}{Y_A} - F$ |

- 1) Axial force  $F_a$ , to be used in calculation of the equivalent dynamic bearing load.
- 2) If no equation is given, the axial force is not taken into consideration.
- 3) For bearings with a contact angle  $40^\circ$  ( $e = 1,14$ ),  $Y = 0,57$  is used in the equations, for bearings with a contact angle  $30^\circ$  ( $e = 0,8$ ) the value to be used is  $Y = 0,76$ .

## Equivalent dynamic bearing load

The equivalent dynamic load  $P$  is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

### Contact angle $40^\circ$

| Arrangement of bearings            | Load ratio                  | Equivalent dynamic load               |
|------------------------------------|-----------------------------|---------------------------------------|
| Single bearing <sup>1)</sup>       | $\frac{F_a}{F_r} \leq 1,14$ | $P = F_r$                             |
|                                    | $\frac{F_a}{F_r} > 1,14$    | $P = 0,35 \cdot F_r + 0,57 \cdot F_a$ |
| Bearing pair in O or X arrangement | $\frac{F_a}{F_r} \leq 1,14$ | $P = F_r + 0,55 \cdot F_a$            |
|                                    | $\frac{F_a}{F_r} > 1,14$    | $P = 0,57 \cdot F_r + 0,93 \cdot F_a$ |

- 1) Calculation of axial force for single bearings, see table Load ratio and axial bearing load.

$P$  kN  
 Equivalent dynamic bearing load for combined load  
 $F_a$  kN  
 Axial dynamic bearing load  
 $F_r$  kN  
 Radial dynamic bearing load.

**Contact angle 30°**

For bearings under dynamic loading, the following applies:

| Arrangement of bearings            | Load ratio                 | Equivalent dynamic bearing load       |
|------------------------------------|----------------------------|---------------------------------------|
| Single bearing <sup>1)</sup>       | $\frac{F_a}{F_r} \leq 0,8$ | $P = F_r$                             |
|                                    | $\frac{F_a}{F_r} > 0,8$    | $P = 0,39 \cdot F_r + 0,76 \cdot F_a$ |
| Bearing pair in O or X arrangement | $\frac{F_a}{F_r} \leq 0,8$ | $P = F_r + 0,78 \cdot F_a$            |
|                                    | $\frac{F_a}{F_r} > 0,8$    | $P = 0,63 \cdot F_r + 1,24 \cdot F_a$ |

1) Calculation of axial force for single bearings, see table Load ratio and axial bearing load, page 226.

**P**                                  kN  
 Equivalent dynamic bearing load for combined load  
**F<sub>a</sub>**                                kN  
 Axial dynamic bearing load  
**F<sub>r</sub>**                                 kN  
 Radial dynamic bearing load.

**Equivalent static bearing load**

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

**Contact angle 40°**

For bearings under static loading, the following applies:

| Arrangement of bearings            | Load ratio                       | Equivalent static load                       |
|------------------------------------|----------------------------------|--|
| Single bearing                     | $\frac{F_{0a}}{F_{0r}} \leq 1,9$ | $P_0 = F_{0r}$                               |
|                                    | $\frac{F_{0a}}{F_{0r}} > 1,9$    | $P_0 = 0,5 \cdot F_{0r} + 0,26 \cdot F_{0a}$ |
| Bearing pair in O or X arrangement | –                                | $P_0 = F_{0r} + 0,52 \cdot F_{0a}$           |

**P<sub>0</sub>**                                 kN  
 Equivalent static bearing load for combined load  
**F<sub>0a</sub>**                                kN  
 Axial static bearing load  
**F<sub>0r</sub>**                                 kN  
 Radial static bearing load.

# Single row angular contact ball bearings

Contact angle 30°

| Arrangement of bearings            | Load ratio                       | Equivalent static load                       |
|------------------------------------|----------------------------------|--|
| Single bearing                     | $\frac{F_{0a}}{F_{0r}} \leq 1,5$ | $P_0 = F_{0r}$                               |
|                                    | $\frac{F_{0a}}{F_{0r}} > 1,5$    | $P_0 = 0,5 \cdot F_{0r} + 0,33 \cdot F_{0a}$ |
| Bearing pair in O or X arrangement | –                                | $P_0 = F_{0r} + 0,66 \cdot F_{0a}$           |

$P_0$  kN  
Equivalent static bearing load for combined load  
 $F_{0a}$  kN  
Axial static bearing load  
 $F_{0r}$  kN  
Radial static bearing load.

## Basic dynamic and static load ratings for bearing pairs

If two bearings of the same size and design are mounted immediately adjacent to each other in an O or X arrangement, the basic dynamic load rating  $C_r$  and basic static load rating  $C_{0r}$  of the bearing pair are as follows:

- $C_r = 1,625 \cdot C_r$  single bearing
- $C_{0r} = 2 \cdot C_{0r}$  single bearing

## Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, ball bearings with cage must therefore be subjected to a minimum radial load of the order of  $P/C_r > 0,01$ .

## Speeds

For standardised bearings, the dimension tables give the limiting speeds  $n_G$  and reference speeds  $n_B$ , while only the limiting speeds are given for the other bearings.



The limiting speeds  $n_G$  in the dimension tables must not be exceeded.

## Bearings of universal design

Bearings with the suffix UA, UL or UO can be used in an X, O or tandem arrangement. The operating speed of the bearing pair is then approximately 20% below the calculated permissible operating speed of the single bearing.

The limiting speed  $n_G$  is possible if the less favourable thermal balance of the bearing pair is taken into consideration.

**Design  
of bearing arrangements**  
Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

**Mounting dimensions**

The bearing tables give the maximum dimensions of the radii  $r_a$  and  $r_{a1}$  and the diameters of the abutment shoulders  $D_a$ ,  $D_b$  and  $d_a$ .

**Accuracy**

Angular contact ball bearings with standardised main dimensions correspond to DIN 628-1.

The dimensional and geometrical tolerances of the standardised bearings correspond to tolerance class PN to DIN 620-2.

We can provide the tolerances of the non-standardised bearings in response to an enquiry.

**Tolerances  
for universal designs and  
for matched bearings**

In addition to normal tolerance (no tolerance suffix), angular contact ball bearings of the universal design UA, UL or UO are also available by agreement in the tolerance class P5 (suffix P5-UL or P5-UA).

Exceptions: Bore tolerances for bearings of all tolerance classes uniformly to P5 (no special suffix).

Width tolerances for universal bearings and matched bearings according to the following table:

**Tolerance for ring width**

| Bore<br>d<br>mm |       | Width deviation<br>$\Delta_{Bs}$<br>$\mu\text{m}$ |      |      |      |
|-----------------|-------|---|------|------|------|
|                 |       | PN  |      | P5   |      |
| over            | incl. | min.  | max. | min. | max. |
| 120             | 180   | 0   | -500 | 0    | -380 |
| 180             | 315   | 0   | -500 | 0    | -500 |
| 315             | 400   | 0   | -630 | 0    | -630 |



# Single row angular contact ball bearings

## Axial internal clearance or preload of universal design

Axial internal clearance or preload of series 70..-B, 72..-B and 73..-B of universal design, in pairs in an X or O arrangement, see table.

The axial internal clearance or freedom from clearance do not apply to mounted bearing pairs. If rigid fits are used, this leads to reduced axial internal clearance or increased preload of the bearing pair.

## Axial internal clearance and preload

| Bore code         | Axial internal clearance or preload of bearing pair<br>Nominal dimension<br>$\mu\text{m}$ |        |        |        |        |        | Preload<br>$F_{V \max}$<br>N |       |
|-------------------|---|--------|--------|--------|--------|--------|------------------------------|-------|
|                   | UA  | UO     | UL     |        |        | UL     |                              |       |
|                   | 70..-B, 72..-B, 73..-B  | 70..-B | 72..-B | 73..-B | 70..-B | 72..-B | 73..-B                       |       |
| Tolerance classes |   |        |        |        |        |        |                              |       |
|                   | PN, P6, P5  | P5     | P5     | P5     | P5     | P5     | P5                           | P5    |
| 30                | 60  | 0      | -      | -13    | -18    | -      | 1723                         | 2 500 |
| 32                | 60  | 0      | -      | -13    | -18    | -      | 1815                         | 2 769 |
| 34                | 70  | 0      | -      | -14    | -19    | -      | 2 038                        | 3 115 |
| 36                | 75  | 0      | -      | -14    | -19    | -      | 2 115                        | 3 192 |
| 38                | 80  | 0      | -      | -14    | -19    | -      | 2 308                        | 3 308 |
| 40                | 90  | 0      | -      | -13    | -20    | -      | 2 462                        | 3 577 |
| 44                | 100   | 0      | -      | -16    | -21    | -      | 2 808                        | 4 077 |
| 48                | 110   | 0      | -      | -15    | -20    | -      | 3 350                        | 4 650 |
| 52                | 120   | 0      | -      | -18    | -24    | -      | 3 750                        | 5 100 |
| 56                | 130   | 0      | -      | -18    | -23    | -      | 3 900                        | 5 600 |
| 60                | 145   | 0      | -      | -17    | -23    | -      | 4 300                        | 5 850 |
| 64                | 160   | 0      | -      | -19    | -22    | -      | 4 650                        | 6 000 |

## Tolerances for axial internal clearance or preload

Tolerances for axial internal clearance or preload of unmounted pairs of angular contact ball bearings of universal design in an X or O arrangement, see table.

## Tolerances in $\mu\text{m}$

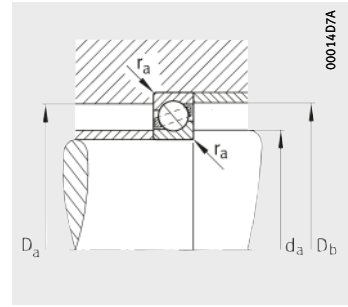
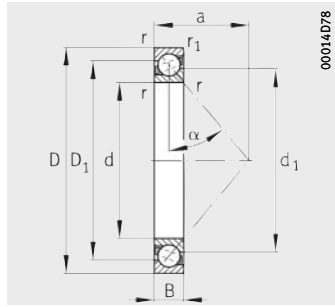
| Bore code | 70..-B, 72..-B    |     | 73..-B |     |
|-----------|-------------------|-----|--------|-----|
|           | Tolerance classes |     |        |     |
|           | PN, P6            | P5  | PN, P6 | P5  |
| 12 to 36  | +12               | +10 | +12    | +10 |
| 38 to 64  | +16               | +14 | +16    | +14 |





# Angular contact ball bearings

Single row



Mounting dimensions

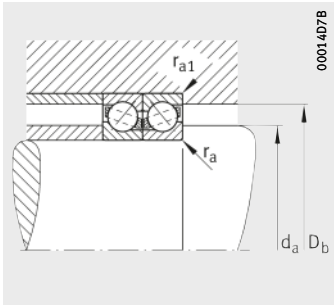
Dimension table - Dimensions in mm

| Designation                         | Mass<br>m<br>≈ kg | Dimensions |     |                     |      |                |                |                |     |    |
|-------------------------------------|-------------------|------------|-----|---------------------|------|----------------|----------------|----------------|-----|----|
|                                     |                   | d          | D   | B                   | r    | r <sub>1</sub> | D <sub>1</sub> | d <sub>1</sub> | a   | α  |
|                                     |                   |            |     |                     | min. | min.           | ≈              | ≈              | ≈   | °  |
| <b>7330-B-MP</b>                    | 24,8              | <b>150</b> | 320 | 65                  | 4    | 1,5            | 255,8          | 218,3          | 131 | 40 |
| <b>7332-B-MP</b>                    | 29                | <b>160</b> | 340 | 68                  | 4    | 1,5            | 270            | 231            | 139 | 40 |
| <b>7334-B-MP</b>                    | 34,4              | <b>170</b> | 360 | 72                  | 4    | 1,5            | 290,9          | 249            | 147 | 40 |
| <b>7236-B-MP</b>                    | 17,5              | <b>180</b> | 320 | 52                  | 4    | 1,5            | 265,8          | 237,4          | 131 | 40 |
| <b>7336-B-MP</b>                    | 39,9              | <b>180</b> | 380 | 75                  | 4    | 1,5            | 303            | 259            | 155 | 40 |
| <b>7238-B-MP</b>                    | 21,1              | <b>190</b> | 340 | 55                  | 4    | 1,5            | 281            | 250            | 139 | 40 |
| <b>7338-B-MP</b>                    | 45,9              | <b>190</b> | 400 | 78                  | 5    | 2              | 318            | 273            | 163 | 40 |
| <b>7240-B-MP</b>                    | 25,6              | <b>200</b> | 360 | 58                  | 4    | 1,5            | 297            | 264            | 146 | 40 |
| <b>7340-B-MP</b>                    | 52,2              | <b>200</b> | 420 | 80                  | 5    | 2              | 336,6          | 288,9          | 170 | 40 |
| <b>7044-B-MP</b>                    | 17,2              | <b>220</b> | 340 | 56                  | 3    | 1,1            | 293,8          | 269            | 109 | 40 |
| <b>Z-576434.SK1<sup>1)</sup></b>    | 18,2              | <b>220</b> | 340 | 56                  | 3    | 1,1            | 293,7          | –              | 109 | 40 |
| <b>7044-MP</b>                      | 17,3              | <b>220</b> | 340 | 56                  | 3    | 1,1            | 292            | 268            | 109 | 30 |
| <b>7244-B-MP</b>                    | 35,1              | <b>220</b> | 400 | 65                  | 4    | 1,5            | 329,5          | 294,5          | 163 | 40 |
| <b>7344-B-MP</b>                    | 68,3              | <b>220</b> | 460 | 88                  | 5    | 2              | 365,7          | 315            | 187 | 40 |
| <b>70948-MP</b>                     | 5,89              | <b>240</b> | 320 | 25                  | 1,5  | 1              | 287            | 272,3          | 93  | 30 |
| <b>71948-MP</b>                     | 7,21              | <b>240</b> | 320 | 38                  | 2,1  | 1,1            | 288            | 271            | 100 | 30 |
| <b>7048-B-MP</b>                    | 18,6              | <b>240</b> | 360 | 56                  | 3    | 1,1            | 313,8          | 289,1          | 154 | 40 |
| <b>7048-MP</b>                      | 18,6              | <b>240</b> | 360 | 56                  | 3    | 1,1            | 317,2          | 285,6          | 115 | 30 |
| <b>7248-B-MP</b>                    | 47,5              | <b>240</b> | 440 | 72                  | 4    | 1,5            | 361            | 320            | 179 | 40 |
| <b>7348-B-MP</b>                    | 87,1              | <b>240</b> | 500 | 95                  | 5    | 2              | 397            | 343            | 203 | 40 |
| <b>Z-507342.01.SK2<sup>2)</sup></b> | 9,46              | <b>250</b> | 340 | 35/38 <sup>3)</sup> | 2,1  | 1,5            | 304            | 286            | 195 | 40 |
| <b>70852-MP</b>                     | 3,45              | <b>260</b> | 320 | 19                  | 1    | 0,6            | 295,7          | 284,3          | 93  | 30 |
| <b>71852-MP</b>                     | 4,64              | <b>260</b> | 320 | 28                  | 2    | 1              | 296            | 284            | 98  | 30 |
| <b>70952-MP</b>                     | 10,1              | <b>260</b> | 360 | 31                  | 2    | 1              | 320            | 300,3          | 105 | 30 |
| <b>71952-MP</b>                     | 11,7              | <b>260</b> | 360 | 46                  | 2,1  | 1,1            | 324,1          | 298,2          | 112 | 30 |
| <b>7052-MP</b>                      | 27,5              | <b>260</b> | 400 | 65                  | 4    | 1,5            | 349,3          | 313,7          | 128 | 30 |
| <b>7252-B-MP</b>                    | 62,5              | <b>260</b> | 480 | 80                  | 5    | 2              | 393            | 348            | 195 | 40 |
| <b>7352-B-MP</b>                    | 109               | <b>260</b> | 540 | 102                 | 6    | 3              | 431            | 371            | 219 | 40 |

<sup>1)</sup> With MPB cage.

<sup>2)</sup> With MP cage.

<sup>3)</sup> The outer ring is 35 mm wide, the inner ring is 38 mm wide.

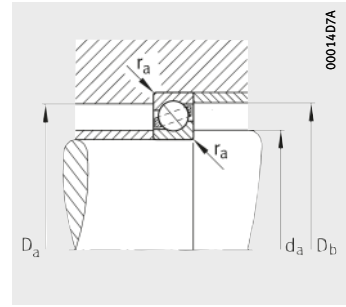
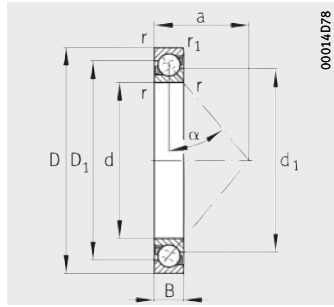


Mounting dimensions

| Mounting dimensions |                |                |                |                 | Basic load ratings  |                       | Calculation factors |      |      |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|----------------|----------------|----------------|-----------------|---------------------|-----------------------|---------------------|------|------|----------------|--------------------|-------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | D <sub>b</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | e                   | X    | Y    | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| min.                | max.           | max.           | max.           | max.            | kN                  | kN                    |                     |      |      |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 167                 | 303            | 311            | 3              | 1,5             | 325                 | 390                   | 1,14                | 0,35 | 0,57 | 0,26           | 14,2               | 3 800             | 2 200             |
| 177                 | 323            | 331            | 3              | 1,5             | 360                 | 450                   | 1,14                | 0,35 | 0,57 | 0,26           | 15,1               | 3 600             | 2 040             |
| 187                 | 343            | 351            | 3              | 1,5             | 405                 | 530                   | 1,14                | 0,35 | 0,57 | 0,26           | 18,1               | 3 200             | 1 840             |
| 197                 | 303            | 311            | 3              | 1,5             | 275                 | 345                   | 1,14                | 0,35 | 0,57 | 0,26           | 12,1               | 3 600             | 2 290             |
| 197                 | 363            | 371            | 3              | 1,5             | 415                 | 560                   | 1,14                | 0,35 | 0,57 | 0,26           | 18,4               | 3 000             | 1 760             |
| 207                 | 323            | 331            | 3              | 1,5             | 300                 | 390                   | 1,14                | 0,35 | 0,57 | 0,26           | 13,2               | 3 200             | 2 140             |
| 210                 | 380            | 389            | 4              | 2               | 430                 | 600                   | 1,14                | 0,35 | 0,57 | 0,26           | 18,7               | 2 800             | 1 680             |
| 217                 | 343            | 351            | 3              | 1,5             | 320                 | 430                   | 1,14                | 0,35 | 0,57 | 0,26           | 14                 | 3 000             | 2 010             |
| 220                 | 400            | 409            | 4              | 2               | 465                 | 655                   | 1,14                | 0,35 | 0,57 | 0,26           | 20,4               | 2 800             | 1 560             |
| 232,4               | 327,6          | 334            | 2,5            | 1               | 255                 | 355                   | 1,14                | 0,35 | 0,57 | 0,26           | 11,5               | 3 000             | 2 080             |
| 232,4               | 327,6          | 334            | 2,5            | 1               | 255                 | 355                   | 1,14                | 0,35 | 0,57 | 0,26           | 11,5               | 3 000             | –                 |
| 232,4               | 327,6          | 334            | 2,5            | 1               | 285                 | 390                   | 0,8                 | 0,39 | 0,76 | 0,33           | 12,8               | 3 000             | –                 |
| 237                 | 383            | 391            | 3              | 1,5             | 365                 | 530                   | 1,14                | 0,35 | 0,57 | 0,26           | 16,5               | 2 800             | 1 790             |
| 240                 | 440            | 449            | 4              | 2               | 530                 | 780                   | 1,14                | 0,35 | 0,57 | 0,26           | 23,4               | 2 800             | 1 400             |
| 247                 | 313            | 315,4          | 1,5            | 1               | 125                 | 186                   | 0,8                 | 0,39 | 0,76 | 0,33           | 6,5                | 3 000             | –                 |
| 250,2               | 309,8          | 314            | 2,1            | 1               | 190                 | 260                   | 0,8                 | 0,39 | 0,76 | 0,33           | 8,9                | 3 000             | –                 |
| 252,4               | 347,6          | 354            | 2,5            | 1               | 270                 | 390                   | 1,14                | 0,35 | 0,57 | 0,26           | 12,2               | 2 800             | 1 890             |
| 252,4               | 347,6          | 354            | 2,5            | 1               | 300                 | 430                   | 0,8                 | 0,39 | 0,76 | 0,33           | 13,7               | 2 800             | –                 |
| 257                 | 423            | 431            | 3              | 1,5             | 440                 | 670                   | 1,14                | 0,35 | 0,57 | 0,26           | 22,3               | 2 800             | 1 520             |
| 260                 | 480            | 489            | 4              | 2               | 600                 | 950                   | 1,14                | 0,35 | 0,57 | 0,26           | 29                 | 2 600             | 1 220             |
| 260,2               | 333            | 333            | 2,1            | 1,5             | 186                 | 255                   | 1,14                | 0,35 | 0,57 | 0,26           | 7,9                | 2 800             | –                 |
| 264,6               | 315,4          | 316,8          | 1              | 0,6             | 76,5                | 125                   | 0,8                 | 0,39 | 0,76 | 0,33           | 3,8                | 3 000             | –                 |
| 268,8               | 311,2          | 315,4          | 2              | 1               | 122                 | 190                   | 0,8                 | 0,39 | 0,76 | 0,33           | 6,3                | 3 000             | –                 |
| 268,8               | 351,2          | 355,4          | 2              | 1               | 186                 | 270                   | 0,8                 | 0,39 | 0,76 | 0,33           | 8,8                | 2 800             | –                 |
| 270,2               | 349,8          | 354            | 2,1            | 1               | 255                 | 375                   | 0,8                 | 0,39 | 0,76 | 0,33           | 11,9               | 2 800             | –                 |
| 274,6               | 385,4          | 393            | 3              | 1,5             | 365                 | 560                   | 0,8                 | 0,39 | 0,76 | 0,33           | 16,7               | 2 800             | –                 |
| 280                 | 460            | 469            | 4              | 2               | 490                 | 765                   | 1,14                | 0,35 | 0,57 | 0,26           | 21,7               | 2 600             | 1 460             |
| 286                 | 514            | 526            | 5              | 2,5             | 655                 | 1 060                 | 1,14                | 0,35 | 0,57 | 0,26           | 30                 | 2 400             | 1 140             |

# Angular contact ball bearings

Single row



Mounting dimensions

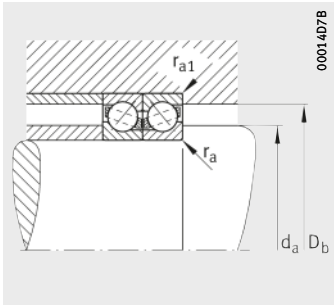
Dimension table (continued) · Dimensions in mm

| Designation                         | Mass<br>m<br>≈ kg | Dimensions |     |     |      |                |                |                |     |    |
|-------------------------------------|-------------------|------------|-----|-----|------|----------------|----------------|----------------|-----|----|
|                                     |                   | d          | D   | B   | r    | r <sub>1</sub> | D <sub>1</sub> | d <sub>1</sub> | a   | α  |
|                                     |                   |            |     |     | min. | min.           | ≈              | ≈              | ≈   | °  |
| <b>70856-MP</b>                     | 5,07              | <b>280</b> | 350 | 22  | 1,1  | 0,6            | 321,7          | 308,3          | 102 | 30 |
| <b>71856-MP</b>                     | 6,86              | <b>280</b> | 350 | 33  | 2    | 1              | 323,9          | 307,8          | 107 | 30 |
| <b>F-801617.01.SK1<sup>1)</sup></b> | 9,17              | <b>280</b> | 370 | 40  | 3    | 1,1            | 336            | 316,4          | 114 | 30 |
| <b>70956-MP</b>                     | 10,8              | <b>280</b> | 380 | 31  | 2    | 1              | 340            | 320,3          | 111 | 30 |
| <b>71956-MP</b>                     | 14,1              | <b>280</b> | 380 | 46  | 2,1  | 1,1            | 344            | 318,3          | 118 | 30 |
| <b>7056-MP</b>                      | 29,2              | <b>280</b> | 420 | 65  | 4    | 1,5            | 369,2          | 333,7          | 133 | 30 |
| <b>7256-B-MP</b>                    | 58,8              | <b>280</b> | 500 | 80  | 5    | 2              | 413            | 368            | 204 | 40 |
| <b>F-804601.SK1<sup>2)</sup></b>    | 134               | <b>280</b> | 579 | 108 | 6    | 3              | 460,5          | 400            | 234 | 40 |
| <b>7356-B-MP</b>                    | 134               | <b>280</b> | 580 | 108 | 6    | 3              | 464,5          | 402,5          | 234 | 40 |
| <b>Z-507343.01.SK1<sup>2)</sup></b> | 13,6              | <b>285</b> | 380 | 46  | 2,1  | 1              | 342            | 323            | 150 | 40 |
| <b>F-800060.SK1<sup>3)</sup></b>    | 14,7              | <b>285</b> | 380 | 46  | 2,1  | 2,1            | 344,9          | 318,3          | 118 | 30 |
| <b>70860-MP</b>                     | 7,11              | <b>300</b> | 380 | 25  | 1,5  | 1              | 346,8          | 334,5          | 111 | 30 |
| <b>71860-MP</b>                     | 9,67              | <b>300</b> | 380 | 38  | 2,1  | 1,1            | 349,1          | 331            | 117 | 30 |
| <b>70960-MP</b>                     | 16,8              | <b>300</b> | 420 | 37  | 2,1  | 1              | 372            | 348            | 112 | 30 |
| <b>71960-MP</b>                     | 22,3              | <b>300</b> | 420 | 56  | 3    | 1,1            | 377,1          | 345,6          | 132 | 30 |
| <b>7060-B-MP</b>                    | 41,5              | <b>300</b> | 460 | 74  | 4    | 1,5            | 398,4          | 365,6          | 196 | 40 |
| <b>F-804853.SK1<sup>2)</sup></b>    | 41,4              | <b>300</b> | 460 | 74  | 4    | 1,5            | 398,4          | 365,6          | 196 | 40 |
| <b>7060-MP</b>                      | 41                | <b>300</b> | 460 | 74  | 4    | 1,5            | 402,9          | 360,6          | 147 | 30 |
| <b>7260-B-MP</b>                    | 83,8              | <b>300</b> | 540 | 85  | 5    | 2              | 444,5          | 397            | 219 | 40 |
| <b>7360-B-MP</b>                    | 157               | <b>300</b> | 620 | 109 | 7,5  | 4              | 493,5          | 428            | 247 | 40 |
| <b>70864-MP</b>                     | 7,6               | <b>320</b> | 400 | 25  | 1,5  | 1              | 366,7          | 353,3          | 116 | 30 |
| <b>71864-MP</b>                     | 10,3              | <b>320</b> | 400 | 38  | 2,1  | 1,1            | 368            | 351            | 123 | 30 |
| <b>70964-MP</b>                     | 17,7              | <b>320</b> | 440 | 37  | 2,1  | 1              | 392            | 368            | 128 | 30 |
| <b>71964-MP</b>                     | 23,6              | <b>320</b> | 440 | 56  | 3    | 1,1            | 397,1          | 365,6          | 138 | 30 |
| <b>7064-MP</b>                      | 46,9              | <b>320</b> | 480 | 74  | 4    | 1,5            | 417            | 383            | 152 | 30 |
| <b>7264-B-MP</b>                    | 104               | <b>320</b> | 580 | 92  | 5    | 2              | 476,5          | 425            | 235 | 40 |
| <b>7364-B-MP</b>                    | 193               | <b>320</b> | 670 | 112 | 7,5  | 4              | 529,4          | 467,6          | 264 | 40 |
| <b>Z-509091.01.SK1<sup>2)</sup></b> | 23,6              | <b>335</b> | 450 | 56  | 2,1  | 1,5            | 402,5          | 382,5          | 193 | 40 |

1) With JP sheet steel cage.

2) With MP cage.

3) With MPA cage.

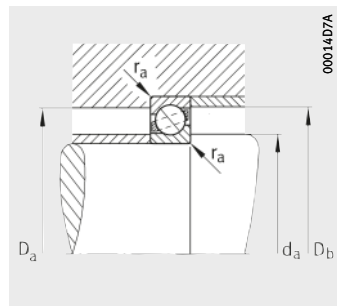
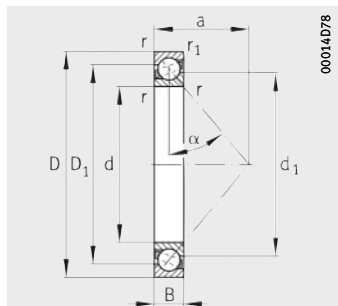


Mounting dimensions

| Mounting dimensions |       |       |      |      | Basic load ratings |           | Calculation factors |      |      |      | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|-------|------|------|--------------------|-----------|---------------------|------|------|------|--------------------|-------------------|-------------------|
| da                  | Da    | Db    | ra   | ra1  | dyn. Cr            | stat. Cor | e                   | X    | Y    | Y0   | Cur                | nG                | nB                |
| min.                | max.  | max.  | max. | max. | kN                 | kN        |                     |      |      |      | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 286                 | 344   | 346,8 | 1    | 0,6  | 100                | 163       | 0,8                 | 0,39 | 0,76 | 0,33 | 5,2                | 2 800             | –                 |
| 288,8               | 341,2 | 345,4 | 2    | 1    | 163                | 250       | 0,8                 | 0,39 | 0,76 | 0,33 | 8                  | 2 800             | –                 |
| 292,4               | 357,6 | 364   | 2,5  | 1    | 245                | 365       | 0,8                 | 0,39 | 0,76 | 0,33 | 11,2               | 1 700             | –                 |
| 288,8               | 371,2 | 375,4 | 2    | 1    | 190                | 285       | 0,8                 | 0,39 | 0,76 | 0,33 | 8,9                | 2 800             | –                 |
| 290,2               | 369,8 | 374   | 2,1  | 1    | 260                | 400       | 0,8                 | 0,39 | 0,76 | 0,33 | 12,3               | 2 800             | –                 |
| 294,6               | 405,4 | 413   | 3    | 1,5  | 375                | 600       | 0,8                 | 0,39 | 0,76 | 0,33 | 17,2               | 2 600             | –                 |
| 300                 | 480   | 489   | 4    | 2    | 500                | 830       | 1,14                | 0,35 | 0,57 | 0,26 | 22,7               | 2 400             | 1 350             |
| 306                 | 554   | 566   | 5    | 2,5  | 735                | 1 270     | 1,14                | 0,35 | 0,57 | 0,26 | 37,5               | 2 000             | –                 |
| 306                 | 554   | 566   | 5    | 2,5  | 735                | 1 270     | 1,14                | 0,35 | 0,57 | 0,26 | 33                 | 2 000             | 1 040             |
| 295                 | 370   | 290   | 2,1  | 1    | 196                | 285       | 1,14                | 0,35 | 0,57 | 0,26 | 8,9                | 2 800             | –                 |
| 290,2               | 369,8 | 374   | 2,1  | 2,1  | 260                | 400       | 0,8                 | 0,39 | 0,76 | 0,33 | 12,3               | 2 800             | –                 |
| 307                 | 373   | 375,4 | 1,5  | 1    | 104                | 176       | 0,8                 | 0,39 | 0,76 | 0,33 | 5,4                | 2 800             | –                 |
| 310,2               | 369,8 | 374   | 2,1  | 1    | 204                | 315       | 0,8                 | 0,39 | 0,76 | 0,33 | 9,6                | 2 800             | –                 |
| 310,2               | 409,8 | 415,4 | 2,1  | 1    | 245                | 375       | 0,8                 | 0,39 | 0,76 | 0,33 | 11,1               | 2 600             | –                 |
| 312,4               | 407,6 | 414   | 2,5  | 1    | 325                | 530       | 0,8                 | 0,39 | 0,76 | 0,33 | 15,6               | 2 600             | –                 |
| 314,6               | 445,4 | 453   | 3    | 1,5  | 390                | 655       | 1,14                | 0,35 | 0,57 | 0,26 | 17,7               | 2 400             | 1 450             |
| 314,6               | 445,4 | 453   | 3    | 1,5  | 390                | 655       | 1,14                | 0,35 | 0,57 | 0,26 | 17,7               | 2 400             | –                 |
| 314,6               | 445,4 | 453   | 3    | 1,5  | 430                | 720       | 0,8                 | 0,39 | 0,76 | 0,33 | 19,6               | 2 400             | –                 |
| 320                 | 520   | 529   | 4    | 2    | 560                | 965       | 1,14                | 0,35 | 0,57 | 0,26 | 26                 | 2 200             | 1 210             |
| 332                 | 588   | 603   | 6    | 3    | 750                | 1 370     | 1,14                | 0,35 | 0,57 | 0,26 | 35                 | 1 900             | 940               |
| 327                 | 393   | 395,4 | 1,5  | 1    | 106                | 186       | 0,8                 | 0,39 | 0,76 | 0,33 | 5,5                | 2 600             | –                 |
| 330,2               | 389,8 | 394   | 2,1  | 1    | 212                | 335       | 0,8                 | 0,39 | 0,76 | 0,33 | 10                 | 2 600             | –                 |
| 330,2               | 429,8 | 435,4 | 2,1  | 1    | 245                | 380       | 0,8                 | 0,39 | 0,76 | 0,33 | 11,1               | 2 400             | –                 |
| 332,4               | 427,6 | 434   | 2,5  | 1    | 340                | 570       | 0,8                 | 0,39 | 0,76 | 0,33 | 16,4               | 2 400             | –                 |
| 334,6               | 465,4 | 473   | 3    | 1,5  | 440                | 765       | 0,8                 | 0,39 | 0,76 | 0,33 | 20,2               | 2 400             | –                 |
| 340                 | 560   | 569   | 4    | 2    | 610                | 1 100     | 1,14                | 0,35 | 0,57 | 0,26 | 28,5               | 1 900             | 1 120             |
| 352                 | 638   | 653   | 6    | 3    | 780                | 1 500     | 1,14                | 0,35 | 0,57 | 0,26 | 36,5               | 1 800             | 860               |
| 345                 | 440   | 443   | 2,1  | 1,5  | 255                | 405       | 1,14                | 0,35 | 0,57 | 0,26 | 11                 | 2 400             | –                 |

# Angular contact ball bearings

Single row



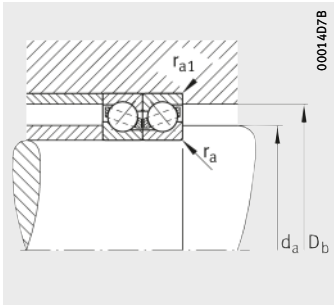
Mounting dimensions

Dimension table (continued) · Dimensions in mm

| Designation                         | Mass<br>m<br>≈ kg | Dimensions |     |     |      |                |                |                |     |    |
|-------------------------------------|-------------------|------------|-----|-----|------|----------------|----------------|----------------|-----|----|
|                                     |                   | d          | D   | B   | r    | r <sub>1</sub> | D <sub>1</sub> | d <sub>1</sub> | a   | α  |
|                                     |                   |            |     |     | min. | min.           | ≈              | ≈              | ≈   | °  |
| <b>70868-MP</b>                     | 8,02              | <b>340</b> | 420 | 25  | 1,5  | 1              | 386,7          | 373,3          | 122 | 30 |
| <b>71868-MP</b>                     | 10,8              | <b>340</b> | 420 | 38  | 2,1  | 1,1            | 390,7          | 370,9          | 129 | 30 |
| <b>70968-MP</b>                     | 18,6              | <b>340</b> | 460 | 37  | 2,1  | 1              | 412            | 388            | 134 | 30 |
| <b>71968-MP</b>                     | 22,7              | <b>340</b> | 460 | 56  | 3    | 1,1            | 415            | 385,3          | 144 | 30 |
| <b>7068-B-MP</b>                    | 62,8              | <b>340</b> | 520 | 82  | 5    | 2              | 450,5          | 413,9          | 221 | 40 |
| <b>7068-MP</b>                      | 63                | <b>340</b> | 520 | 82  | 5    | 2              | 448            | 412            | 165 | 30 |
| <b>7268-B-MP</b>                    | 123               | <b>340</b> | 620 | 92  | 6    | 3              | 506,5          | 455            | 247 | 40 |
| <b>7368-B-MPB</b>                   | 218               | <b>340</b> | 710 | 118 | 7,5  | 4              | 557,5          | 492,2          | 279 | 40 |
| <b>70872-MP</b>                     | 8,45              | <b>360</b> | 440 | 25  | 1,5  | 1              | 406,7          | 393,3          | 128 | 30 |
| <b>71872-MP</b>                     | 11,5              | <b>360</b> | 440 | 38  | 2,1  | 1,1            | 408            | 391            | 134 | 30 |
| <b>70972-MP</b>                     | 19,6              | <b>360</b> | 480 | 37  | 2,1  | 1              | 432            | 408            | 140 | 30 |
| <b>71972-MP</b>                     | 23                | <b>360</b> | 480 | 56  | 3    | 1,1            | 437,1          | 405,7          | 149 | 30 |
| <b>7072-B-MP</b>                    | 61,6              | <b>360</b> | 540 | 82  | 5    | 2              | 470,5          | 433,9          | 230 | 40 |
| <b>7072-MP</b>                      | 61,1              | <b>360</b> | 540 | 82  | 5    | 2              | 475,5          | 428,4          | 171 | 30 |
| <b>7272-B-MP</b>                    | 138               | <b>360</b> | 650 | 95  | 6    | 3              | 534,4          | 481,6          | 259 | 40 |
| <b>7372-B-MPB</b>                   | 280               | <b>360</b> | 750 | 125 | 7,5  | 4              | 588,5          | 520,7          | 295 | 40 |
| <b>70876-MP</b>                     | 13,8              | <b>380</b> | 480 | 31  | 2    | 1              | 438,7          | 421,3          | 140 | 30 |
| <b>71876-MP</b>                     | 18,6              | <b>380</b> | 480 | 46  | 2,1  | 1,1            | 443,6          | 418,7          | 147 | 30 |
| <b>F-804862.SKL<sup>1)</sup></b>    | 17                | <b>380</b> | 480 | 50  | 2,1  | 1,1            | 446            | 416,5          | 147 | 30 |
| <b>70976-MP</b>                     | 29                | <b>380</b> | 520 | 44  | 3    | 1,1            | 464,5          | 435,6          | 152 | 30 |
| <b>Z-509092.01.SKL<sup>2)</sup></b> | 39,8              | <b>380</b> | 520 | 65  | 2,5  | 2,5            | 465,4          | 438            | 221 | 40 |
| <b>71976-MP</b>                     | 41,7              | <b>380</b> | 520 | 65  | 4    | 1,5            | 468            | 432            | 162 | 30 |
| <b>7076-MP</b>                      | 69,1              | <b>380</b> | 560 | 82  | 5    | 2              | 488            | 452            | 177 | 30 |
| <b>7276-B-MP</b>                    | 152               | <b>380</b> | 680 | 95  | 6    | 3              | 557,5          | 504            | 270 | 40 |
| <b>7376-B-MP</b>                    | 314               | <b>380</b> | 780 | 128 | 7,5  | 4              | 614,8          | 544,7          | 307 | 40 |
| <b>70880-MP</b>                     | 14,7              | <b>400</b> | 500 | 31  | 2    | 1              | 458,7          | 441,3          | 145 | 30 |
| <b>71880-MP</b>                     | 20,4              | <b>400</b> | 500 | 46  | 2,1  | 1,1            | 462,4          | 437,6          | 153 | 30 |
| <b>70980-MP</b>                     | 30,3              | <b>400</b> | 540 | 44  | 3    | 1,1            | 484,5          | 455,6          | 158 | 30 |
| <b>71980-MP</b>                     | 39,4              | <b>400</b> | 540 | 65  | 4    | 1,5            | 488            | 452            | 168 | 30 |
| <b>7080-MP</b>                      | 83,3              | <b>400</b> | 600 | 90  | 5    | 2              | 520            | 480            | 189 | 30 |
| <b>7280-B-MPB</b>                   | 188               | <b>400</b> | 720 | 103 | 6    | 3              | 592,9          | 533,8          | 286 | 40 |
| <b>7380-B-MP</b>                    | 369               | <b>400</b> | 820 | 136 | 7,5  | 4              | 647            | 572,7          | 324 | 40 |
| <b>Z-509093.01.SKL<sup>2)</sup></b> | 47,5              | <b>410</b> | 560 | 70  | 3,5  | 3,5            | 499,7          | 470,3          | 239 | 40 |

<sup>1)</sup> Full complement.

<sup>2)</sup> With MP cage.

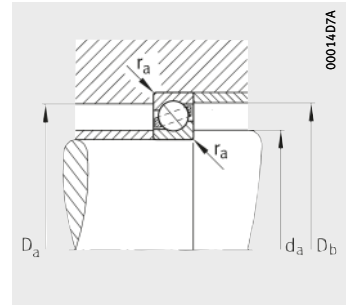
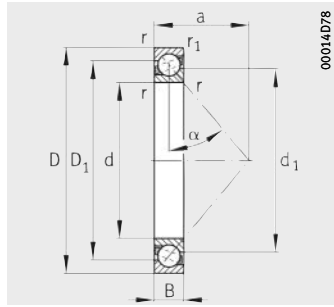


Mounting dimensions

| Mounting dimensions |                |                |                |                 | Basic load ratings  |                       | Calculation factors |      |      |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|----------------|----------------|----------------|-----------------|---------------------|-----------------------|---------------------|------|------|----------------|--------------------|-------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | D <sub>b</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | e                   | X    | Y    | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| min.                | max.           | max.           | max.           | max.            | kN                  | kN                    |                     |      |      |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 347                 | 413            | 415,4          | 1,5            | 1               | 108                 | 196                   | 0,8                 | 0,39 | 0,76 | 0,33           | 5,6                | 2 400             | –                 |
| 350,2               | 409,8          | 414            | 2,1            | 1               | 212                 | 345                   | 0,8                 | 0,39 | 0,76 | 0,33           | 10,2               | 2 400             | –                 |
| 350,2               | 449,8          | 455,4          | 2,1            | 1               | 250                 | 405                   | 0,8                 | 0,39 | 0,76 | 0,33           | 11,3               | 2 400             | –                 |
| 352,4               | 447,6          | 454            | 2,5            | 1               | 340                 | 570                   | 0,8                 | 0,39 | 0,76 | 0,33           | 18,1               | 2 400             | –                 |
| 358                 | 502            | 511,2          | 4              | 2               | 465                 | 850                   | 1,14                | 0,35 | 0,57 | 0,26           | 22,8               | 2 000             | –                 |
| 358                 | 502            | 511,2          | 4              | 2               | 520                 | 930                   | 0,8                 | 0,39 | 0,76 | 0,33           | 27,5               | 2 000             | –                 |
| 366                 | 594            | 606            | 5              | 2,5             | 630                 | 1 180                 | 1,14                | 0,35 | 0,57 | 0,26           | 31,5               | 1 800             | 1 000             |
| 372                 | 678            | 693            | 6              | 3               | 865                 | 1 700                 | 1,14                | 0,35 | 0,57 | 0,26           | 40,5               | 1 600             | 790               |
| 367                 | 433            | 435,4          | 1,5            | 1               | 110                 | 204                   | 0,8                 | 0,39 | 0,76 | 0,33           | 5,7                | 2 400             | –                 |
| 370,2               | 429,8          | 434            | 2,1            | 1               | 216                 | 365                   | 0,8                 | 0,39 | 0,76 | 0,33           | 10,3               | 2 400             | –                 |
| 370,2               | 469,8          | 475,4          | 2,1            | 1               | 255                 | 425                   | 0,8                 | 0,39 | 0,76 | 0,33           | 11,6               | 2 200             | –                 |
| 372,4               | 467,6          | 474            | 2,5            | 1               | 345                 | 600                   | 0,8                 | 0,39 | 0,76 | 0,33           | 16,8               | 2 200             | –                 |
| 378                 | 522            | 531,2          | 4              | 2               | 475                 | 880                   | 1,14                | 0,35 | 0,57 | 0,26           | 23,4               | 1 900             | 1 130             |
| 378                 | 522            | 531,2          | 4              | 2               | 530                 | 980                   | 0,8                 | 0,39 | 0,76 | 0,33           | 26                 | 1 900             | –                 |
| 386                 | 624            | 636            | 5              | 2,5             | 695                 | 1 340                 | 1,14                | 0,35 | 0,57 | 0,26           | 34,5               | 1 600             | 920               |
| 392                 | 718            | 733            | 6              | 3               | 900                 | 1 830                 | 1,14                | 0,35 | 0,57 | 0,26           | 43,5               | 1 500             | 740               |
| 388,8               | 471,2          | 475,4          | 2              | 1               | 166                 | 290                   | 0,8                 | 0,39 | 0,76 | 0,33           | 8                  | 2 000             | –                 |
| 390,2               | 469,8          | 474            | 2,1            | 1               | 285                 | 490                   | 0,8                 | 0,39 | 0,76 | 0,33           | 13,5               | 2 000             | –                 |
| 390,2               | 469,8          | 474            | 2,1            | 1               | 360                 | 640                   | 0,8                 | 0,39 | 0,76 | 0,33           | 17,5               | 1 300             | –                 |
| 392,4               | 507,6          | 514            | 2,5            | 1               | 320                 | 560                   | 0,8                 | 0,39 | 0,76 | 0,33           | 15                 | 1 900             | –                 |
| 390                 | 510            | 510            | 2,5            | 2,5             | 355                 | 630                   | 1,14                | 0,35 | 0,57 | 0,26           | 16,1               | 1 900             | –                 |
| 394,6               | 505,4          | 513            | 3              | 1,5             | 400                 | 720                   | 0,8                 | 0,39 | 0,76 | 0,33           | 19,6               | 1 900             | –                 |
| 398                 | 542            | 551,2          | 4              | 2               | 540                 | 1 040                 | 0,8                 | 0,39 | 0,76 | 0,33           | 25,5               | 1 900             | –                 |
| 406                 | 654            | 666            | 5              | 2,5             | 710                 | 1 430                 | 1,14                | 0,35 | 0,57 | 0,26           | 34,5               | 1 600             | 870               |
| 412                 | 748            | 763            | 6              | 3               | 950                 | 1 960                 | 1,14                | 0,35 | 0,57 | 0,26           | 45                 | 1 400             | 750               |
| 408,8               | 491,2          | 495,4          | 2              | 1               | 170                 | 310                   | 0,8                 | 0,39 | 0,76 | 0,33           | 8,3                | 1 900             | –                 |
| 410,2               | 489,8          | 494            | 2,1            | 1               | 290                 | 510                   | 0,8                 | 0,39 | 0,76 | 0,33           | 14,5               | 1 900             | –                 |
| 412,4               | 527,6          | 534            | 2,5            | 1               | 325                 | 585                   | 0,8                 | 0,39 | 0,76 | 0,33           | 15,5               | 1 900             | –                 |
| 414,6               | 525,4          | 533            | 3              | 1,5             | 415                 | 765                   | 0,8                 | 0,39 | 0,76 | 0,33           | 20,3               | 1 900             | –                 |
| 418                 | 582            | 591,2          | 4              | 2               | 600                 | 1 180                 | 0,8                 | 0,39 | 0,76 | 0,33           | 29,5               | 1 800             | –                 |
| 426                 | 694            | 706            | 5              | 2,5             | 765                 | 1 600                 | 1,14                | 0,35 | 0,57 | 0,26           | 36,5               | 1 500             | 830               |
| 432                 | 788            | 803            | 6              | 3               | 1 020               | 2 200                 | 1,14                | 0,35 | 0,57 | 0,26           | 50                 | 1 400             | 700               |
| 423                 | 547            | 547            | 3,5            | 3,5             | 380                 | 695                   | 1,14                | 0,35 | 0,57 | 0,26           | 21                 | 1 800             | –                 |

# Angular contact ball bearings

Single row



Mounting dimensions

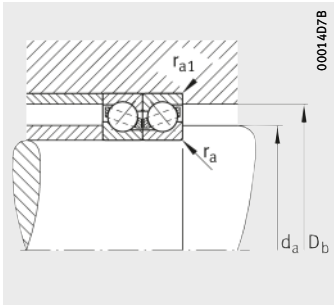
Dimension table (continued) · Dimensions in mm

| Designation                         | Mass<br>m<br>≈ kg | Dimensions |     |     |      |                |                |                |     |    |
|-------------------------------------|-------------------|------------|-----|-----|------|----------------|----------------|----------------|-----|----|
|                                     |                   | d          | D   | B   | r    | r <sub>1</sub> | D <sub>1</sub> | d <sub>1</sub> | a   | α  |
|                                     |                   |            |     |     | min. | min.           | ≈              | ≈              | ≈   | °  |
| <b>70884-MP</b>                     | 15,4              | <b>420</b> | 520 | 31  | 2    | 1              | 478,7          | 461,3          | 151 | 30 |
| <b>71884-MP</b>                     | 20,3              | <b>420</b> | 520 | 46  | 2,1  | 1,1            | 483,7          | 458,4          | 159 | 30 |
| <b>70984-MP</b>                     | 31,6              | <b>420</b> | 560 | 44  | 3    | 1,1            | 504,5          | 475,6          | 164 | 30 |
| <b>71984-MP</b>                     | 41,4              | <b>420</b> | 560 | 65  | 4    | 1,5            | 508,2          | 474,6          | 174 | 30 |
| <b>7084-MP</b>                      | 86,8              | <b>420</b> | 620 | 90  | 5    | 2              | 540            | 500            | 195 | 30 |
| <b>7284-B-MPB</b>                   | 228               | <b>420</b> | 760 | 109 | 7,5  | 4              | 619            | 560,7          | 302 | 40 |
| <b>7384-B-MP</b>                    | 395               | <b>420</b> | 850 | 136 | 9,5  | 5              | 672            | 597,7          | 334 | 40 |
| <b>70888-MP</b>                     | 16                | <b>440</b> | 540 | 31  | 2    | 1              | 498,7          | 481,3          | 157 | 30 |
| <b>71888-MP</b>                     | 21,3              | <b>440</b> | 540 | 46  | 2,1  | 1,1            | 502,4          | 477,6          | 164 | 30 |
| <b>F-803794.SK1<sup>1)</sup></b>    | 17,3              | <b>440</b> | 540 | 46  | 2,1  | 0,6            | 502            | 481            | 164 | 30 |
| <b>F-808756.SK2<sup>2)</sup></b>    | 45,3              | <b>440</b> | 580 | 70  | 4    | 1,5            | 530,9          | 493            | 184 | 30 |
| <b>70988-MP</b>                     | 42,2              | <b>440</b> | 600 | 50  | 4    | 1,5            | 538,5          | 503,5          | 175 | 30 |
| <b>Z-509094.01.SK2<sup>2)</sup></b> | 56,9              | <b>440</b> | 600 | 74  | 3,5  | 3,5            | 540            | 500            | 255 | 40 |
| <b>71988-MP</b>                     | 56,9              | <b>440</b> | 600 | 74  | 4    | 1,5            | 540            | 500            | 187 | 30 |
| <b>7088-MP</b>                      | 102               | <b>440</b> | 650 | 94  | 6    | 3              | 566,5          | 523            | 204 | 30 |
| <b>7288-B-MP</b>                    | 255               | <b>440</b> | 790 | 112 | 7,5  | 4              | 645,5          | 584,2          | 314 | 40 |
| <b>7388-B-MP</b>                    | 477               | <b>440</b> | 900 | 145 | 9,5  | 5              | 709            | 630,7          | 350 | 40 |
| <b>70892-MP</b>                     | 24,3              | <b>460</b> | 580 | 37  | 2,1  | 1,1            | 531,1          | 509            | 169 | 30 |
| <b>71892-MP</b>                     | 32,2              | <b>460</b> | 580 | 56  | 3    | 1,1            | 536,9          | 506            | 178 | 30 |
| <b>F-803705.SK2<sup>2)</sup></b>    | 37,2              | <b>460</b> | 600 | 50  | 3    | 1,1            | 535,4          | 507            | 178 | 30 |
| <b>70992-MP</b>                     | 44,6              | <b>460</b> | 620 | 50  | 4    | 1,5            | 558,5          | 523,5          | 181 | 30 |
| <b>71992-MP</b>                     | 53,9              | <b>460</b> | 620 | 74  | 4    | 1,5            | 560            | 520            | 193 | 30 |
| <b>7092-MP</b>                      | 115               | <b>460</b> | 680 | 100 | 6    | 3              | 600,1          | 544,5          | 214 | 30 |
| <b>7292-B-MPB</b>                   | 287               | <b>460</b> | 830 | 118 | 7,5  | 4              | 677,5          | 612,3          | 330 | 40 |
| <b>7392-B-MP</b>                    | 573               | <b>460</b> | 950 | 155 | 9,5  | 5              | 746            | 663,2          | 373 | 40 |
| <b>Z-510289.01.SK2<sup>2)</sup></b> | 68,4              | <b>465</b> | 635 | 76  | 3,5  | 3,5            | 565,5          | 533,5          | 269 | 40 |
| <b>70896-MP</b>                     | 25,2              | <b>480</b> | 600 | 37  | 2,1  | 1,1            | 551,1          | 529            | 174 | 30 |
| <b>71896-MP</b>                     | 33,9              | <b>480</b> | 600 | 56  | 3    | 1,1            | 556,8          | 526            | 184 | 30 |
| <b>70996-MP</b>                     | 54,3              | <b>480</b> | 650 | 54  | 4    | 1,5            | 582            | 548            | 190 | 30 |
| <b>71996-MP</b>                     | 73,6              | <b>480</b> | 650 | 78  | 5    | 2              | 586            | 544,7          | 202 | 30 |
| <b>7096-MP</b>                      | 129               | <b>480</b> | 700 | 100 | 6    | 3              | 613            | 567            | 220 | 30 |
| <b>7296-B-MPB</b>                   | 348               | <b>480</b> | 870 | 125 | 7,5  | 4              | 710            | 640,2          | 346 | 40 |
| <b>7396-B-MP</b>                    | 618               | <b>480</b> | 980 | 160 | 9,5  | 5              | 773,5          | 686,2          | 386 | 40 |

<sup>1)</sup> With JP sheet steel cage.

<sup>2)</sup> With MP cage.



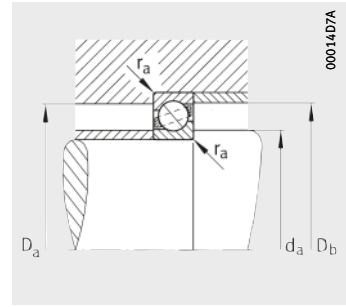
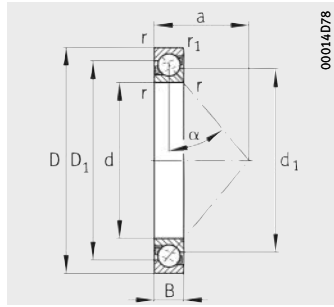


Mounting dimensions

| Mounting dimensions |                |                |                |                 | Basic load ratings  |                       | Calculation factors |      |      |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|----------------|----------------|----------------|-----------------|---------------------|-----------------------|---------------------|------|------|----------------|--------------------|-------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | D <sub>b</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | e                   | X    | Y    | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| min.                | max.           | max.           | max.           | max.            | kN                  | kN                    |                     |      |      |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 428,8               | 511,2          | 515,4          | 2              | 1               | 173                 | 320                   | 0,8                 | 0,39 | 0,76 | 0,33           | 8,4                | 1 900             | –                 |
| 430,2               | 509,8          | 514            | 2,1            | 1               | 300                 | 550                   | 0,8                 | 0,39 | 0,76 | 0,33           | 14,2               | 1 900             | –                 |
| 432,4               | 547,6          | 554            | 2,5            | 1               | 335                 | 620                   | 0,8                 | 0,39 | 0,76 | 0,33           | 15,9               | 1 800             | –                 |
| 434,6               | 545,4          | 553            | 3              | 1,5             | 415                 | 780                   | 0,8                 | 0,39 | 0,76 | 0,33           | 20,5               | 1 800             | –                 |
| 438                 | 602            | 611,2          | 4              | 2               | 620                 | 1 250                 | 0,8                 | 0,39 | 0,76 | 0,33           | 30                 | 1 600             | –                 |
| 452                 | 728            | 743            | 6              | 3               | 800                 | 1 730                 | 1,14                | 0,35 | 0,57 | 0,26           | 38,5               | 1 400             | 790               |
| 460                 | 810            | 830            | 8              | 4               | 1 060               | 2 360                 | 1,14                | 0,35 | 0,57 | 0,26           | 53                 | 1 300             | 630               |
| 448,8               | 531,2          | 535,4          | 2              | 1               | 176                 | 335                   | 0,8                 | 0,39 | 0,76 | 0,33           | 8,6                | 1 800             | –                 |
| 450,2               | 529,8          | 534            | 2,1            | 1               | 300                 | 550                   | 0,8                 | 0,39 | 0,76 | 0,33           | 14,4               | 1 800             | –                 |
| 450,2               | 529,8          | 534            | 2,1            | 0,6             | 345                 | 640                   | 0,8                 | 0,39 | 0,76 | 0,33           | 16,5               | 1 100             | –                 |
| 454,6               | 565,4          | 573            | 3              | 1,5             | 475                 | 930                   | 0,8                 | 0,39 | 0,76 | 0,33           | 23,6               | 1 600             | –                 |
| 454,6               | 585,4          | 593            | 3              | 1,5             | 405                 | 780                   | 0,8                 | 0,39 | 0,76 | 0,33           | 19,4               | 1 600             | –                 |
| 453                 | 587            | 587            | 3,5            | 3,5             | 440                 | 865                   | 1,14                | 0,35 | 0,57 | 0,26           | 23,9               | 1 600             | –                 |
| 454,6               | 585,4          | 593            | 3              | 1,5             | 500                 | 1 000                 | 0,8                 | 0,39 | 0,76 | 0,33           | 24,7               | 1 600             | –                 |
| 463                 | 627            | 637,6          | 5              | 5               | 655                 | 1 370                 | 0,8                 | 0,39 | 0,76 | 0,33           | 31,5               | 1 500             | –                 |
| 472                 | 758            | 773            | 6              | 3               | 850                 | 1 860                 | 1,14                | 0,35 | 0,57 | 0,26           | 40,5               | 1 400             | 850               |
| 480                 | 860            | 880            | 8              | 4               | 1 160               | 2 650                 | 1,14                | 0,35 | 0,57 | 0,26           | 55                 | 1 200             | 600               |
| 470,2               | 569,8          | 574            | 2,1            | 1               | 250                 | 465                   | 0,8                 | 0,39 | 0,76 | 0,33           | 11,5               | 1 600             | –                 |
| 472                 | 568            | 574            | 2,5            | 1               | 380                 | 735                   | 0,8                 | 0,39 | 0,76 | 0,33           | 18,6               | 1 600             | –                 |
| 472                 | 568            | 574            | 2,5            | 1               | 375                 | 720                   | 0,8                 | 0,39 | 0,76 | 0,33           | 17,9               | 1 600             | –                 |
| 474,6               | 605,4          | 613            | 3              | 1,5             | 415                 | 800                   | 0,8                 | 0,39 | 0,76 | 0,33           | 19,5               | 1 500             | –                 |
| 474,6               | 605,4          | 613            | 3              | 1,5             | 500                 | 1 020                 | 0,8                 | 0,39 | 0,76 | 0,33           | 25                 | 1 500             | –                 |
| 483                 | 657            | 667,6          | 5              | 2,5             | 710                 | 1 500                 | 0,8                 | 0,39 | 0,76 | 0,33           | 37                 | 1 400             | –                 |
| 492                 | 798            | 813            | 6              | 3               | 930                 | 2 120                 | 1,14                | 0,35 | 0,57 | 0,26           | 45                 | 1 300             | 690               |
| 500                 | 910            | 930            | 8              | 4               | 1 250               | 3 000                 | 1,14                | 0,35 | 0,57 | 0,26           | 62                 | 1 200             | 560               |
| 478                 | 622            | 622            | 3,5            | 3,5             | 450                 | 900                   | 1,14                | 0,35 | 0,57 | 0,26           | 20,9               | 1 500             | –                 |
| 490,2               | 589,8          | 594            | 2,1            | 1               | 255                 | 480                   | 0,8                 | 0,39 | 0,76 | 0,33           | 11,7               | 1 500             | –                 |
| 492,4               | 587,6          | 594            | 2,5            | 1               | 390                 | 765                   | 0,8                 | 0,39 | 0,76 | 0,33           | 19,1               | 1 500             | –                 |
| 494,6               | 635,4          | 643            | 3              | 1,5             | 430                 | 865                   | 0,8                 | 0,39 | 0,76 | 0,33           | 21,1               | 1 500             | –                 |
| 498                 | 632            | 641,2          | 4              | 2               | 540                 | 1 100                 | 0,8                 | 0,39 | 0,76 | 0,33           | 26                 | 1 500             | –                 |
| 503                 | 677            | 687,6          | 5              | 2,5             | 720                 | 1 600                 | 0,8                 | 0,39 | 0,76 | 0,33           | 35                 | 1 400             | –                 |
| 512                 | 838            | 853            | 6              | 3               | 1 040               | 2 400                 | 1,14                | 0,35 | 0,57 | 0,26           | 51                 | 1 200             | 750               |
| 520                 | 940            | 960            | 8              | 4               | 1 290               | 3 050                 | 1,14                | 0,35 | 0,57 | 0,26           | 63                 | 1 100             | 560               |

# Angular contact ball bearings

Single row



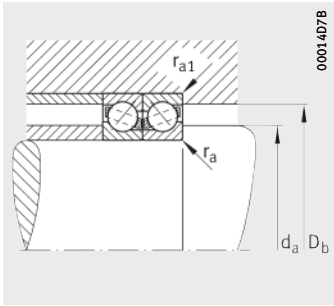
Mounting dimensions

Dimension table (continued) · Dimensions in mm

| Designation                      | Mass<br>m<br>≈ kg | Dimensions |      |     |      |                |                |                |     |    |
|----------------------------------|-------------------|------------|------|-----|------|----------------|----------------|----------------|-----|----|
|                                  |                   | d          | D    | B   | r    | r <sub>1</sub> | D <sub>1</sub> | d <sub>1</sub> | a   | α  |
|                                  |                   |            |      |     | min. | min.           | ≈              | ≈              | ≈   | °  |
| <b>708/500-MP</b>                | 26,2              | <b>500</b> | 620  | 37  | 2,1  | 1,1            | 571,1          | 549            | 190 | 30 |
| <b>718/500-MP</b>                | 35,1              | <b>500</b> | 620  | 56  | 3    | 1,1            | 576,8          | 546            | 190 | 30 |
| <b>709/500-MP</b>                | 56,1              | <b>500</b> | 670  | 54  | 4    | 1,5            | 602            | 568            | 196 | 30 |
| <b>719/500-MP</b>                | 72                | <b>500</b> | 670  | 78  | 5    | 2              | 606            | 564,7          | 208 | 30 |
| <b>70/500-MP</b>                 | 133               | <b>500</b> | 720  | 100 | 6    | 3              | 633            | 587            | 226 | 30 |
| <b>72/500-B-MPB</b>              | 431               | <b>500</b> | 920  | 136 | 7,5  | 4              | 747            | 672,7          | 366 | 40 |
| <b>73/500-B-MPB</b>              | 731               | <b>500</b> | 1030 | 170 | 12   | 6              | 810,5          | 719,2          | 406 | 40 |
| <b>Z-556716.SKL<sup>1)</sup></b> | 14,7              | <b>530</b> | 600  | 35  | 2    | 1              | 572,5          | 557,5          | 181 | 30 |
| <b>708/530-MP</b>                | 27,6              | <b>530</b> | 650  | 37  | 2,1  | 1,1            | 601,1          | 579            | 189 | 30 |
| <b>718/530-MP</b>                | 37,2              | <b>530</b> | 650  | 56  | 3    | 1,1            | 606,7          | 576            | 198 | 30 |
| <b>709/530-MP</b>                | 66,6              | <b>530</b> | 710  | 57  | 4    | 1,5            | 639            | 601            | 208 | 30 |
| <b>719/530-MP</b>                | 84,9              | <b>530</b> | 710  | 82  | 5    | 2              | 645,3          | 598,7          | 220 | 30 |
| <b>70/530-MPB</b>                | 180               | <b>530</b> | 780  | 112 | 6    | 3              | 691,3          | 624,6          | 245 | 30 |
| <b>72/530-B-MPB</b>              | 524               | <b>530</b> | 980  | 145 | 9,5  | 5              | 794            | 715,7          | 389 | 40 |
| <b>708/560-MP</b>                | 25,8              | <b>560</b> | 680  | 37  | 2,1  | 1,1            | 631,1          | 609            | 198 | 30 |
| <b>Z-560752.SKL<sup>1)</sup></b> | 28,9              | <b>560</b> | 680  | 42  | 3,5  | 2              | 631,1          | 609            | 200 | 30 |
| <b>718/560-MP</b>                | 30,1              | <b>560</b> | 680  | 56  | 3    | 1,1            | 636,8          | 606            | 207 | 30 |
| <b>709/560-MP</b>                | 78,1              | <b>560</b> | 750  | 60  | 5    | 2              | 675            | 635            | 219 | 30 |
| <b>719/560-MP</b>                | 98,2              | <b>560</b> | 750  | 85  | 5    | 2              | 681            | 632,2          | 232 | 30 |
| <b>70/560-MPB</b>                | 207               | <b>560</b> | 820  | 115 | 6    | 3              | 726,7          | 658,1          | 257 | 30 |
| <b>72/560-B-MPB</b>              | 595               | <b>560</b> | 1030 | 150 | 9,5  | 5              | 836,5          | 753,7          | 409 | 40 |
| <b>708/600-MP</b>                | 37,7              | <b>600</b> | 730  | 42  | 3    | 1,1            | 676,7          | 655,3          | 213 | 30 |
| <b>Z-560519.SKL<sup>2)</sup></b> | 41,4              | <b>600</b> | 730  | 45  | 2,7  | 2,7            | 676,7          | 655,3          | 213 | 30 |
| <b>718/600-MP</b>                | 49,1              | <b>600</b> | 730  | 60  | 3    | 1,1            | 681,5          | 651,3          | 222 | 30 |
| <b>709/600-MP</b>                | 92,2              | <b>600</b> | 800  | 63  | 5    | 2              | 721            | 679            | 234 | 30 |
| <b>719/600-MP</b>                | 122               | <b>600</b> | 800  | 90  | 5    | 2              | 727,5          | 676            | 247 | 30 |
| <b>70/600-MPB</b>                | 232               | <b>600</b> | 870  | 118 | 6    | 3              | 763            | 706,5          | 271 | 30 |
| <b>72/600-B-MPB</b>              | 686               | <b>600</b> | 1090 | 155 | 9,5  | 5              | 886,5          | 803,7          | 432 | 40 |

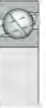
<sup>1)</sup> Separable bearing with MP cage.

<sup>2)</sup> Separable bearing with MPBS cage.



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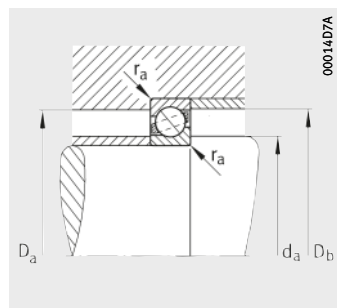
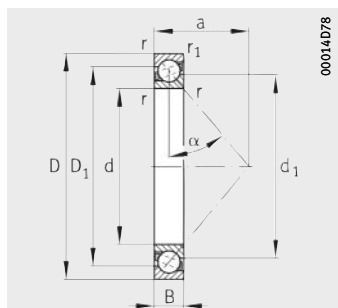
Mounting dimensions



| Mounting dimensions |       |       |      |      | Basic load ratings |           | Calculation factors |      |      |      | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|-------|------|------|--------------------|-----------|---------------------|------|------|------|--------------------|-------------------|-------------------|
| da                  | Da    | Db    | ra   | ra1  | dyn. Cr            | stat. Cor | e                   | X    | Y    | Y0   | Cur                | nG                | nB                |
| min.                | max.  | max.  | max. | max. | kN                 | kN        |                     |      |      |      | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 510,2               | 609,8 | 614   | 2,1  | 1    | 260                | 500       | 0,8                 | 0,39 | 0,76 | 0,33 | 12                 | 1 500             | –                 |
| 512,4               | 607,6 | 614   | 2,5  | 1    | 390                | 780       | 0,8                 | 0,39 | 0,76 | 0,33 | 19,1               | 1 500             | –                 |
| 514,6               | 655,4 | 663   | 3    | 1,5  | 440                | 900       | 0,8                 | 0,39 | 0,76 | 0,33 | 21,2               | 1 400             | –                 |
| 518                 | 652   | 661,2 | 4    | 2    | 550                | 1 180     | 0,8                 | 0,39 | 0,76 | 0,33 | 27                 | 1 400             | –                 |
| 523                 | 697   | 707,6 | 5    | 2,5  | 735                | 1 660     | 0,8                 | 0,39 | 0,76 | 0,33 | 35,5               | 1 400             | –                 |
| 532                 | 888   | 903   | 6    | 3    | 1 120              | 2 700     | 1,14                | 0,35 | 0,57 | 0,26 | 57                 | 1 200             | 700               |
| 548                 | 982   | 1 004 | 10   | 5    | 1 370              | 3 400     | 1,14                | 0,35 | 0,57 | 0,26 | 67                 | 1 100             | 530               |
| 538,8               | 591,2 | 595,4 | 2    | 1    | 134                | 280       | 0,8                 | 0,39 | 0,76 | 0,33 | 6,6                | 1 500             | –                 |
| 540,2               | 639,8 | 644   | 2,1  | 1    | 265                | 520       | 0,8                 | 0,39 | 0,76 | 0,33 | 12,3               | 1 400             | –                 |
| 542,4               | 637,6 | 644   | 2,5  | 1    | 405                | 830       | 0,8                 | 0,39 | 0,76 | 0,33 | 19,8               | 1 400             | –                 |
| 544,6               | 695,4 | 703   | 3    | 1,5  | 500                | 1 080     | 0,8                 | 0,39 | 0,76 | 0,33 | 24,5               | 1 400             | –                 |
| 548                 | 692   | 701,2 | 4    | 2    | 610                | 1 340     | 0,8                 | 0,39 | 0,76 | 0,33 | 31                 | 1 400             | –                 |
| 553                 | 757   | 767,6 | 5    | 2,5  | 850                | 1 960     | 0,8                 | 0,39 | 0,76 | 0,33 | 42,5               | 1 300             | –                 |
| 570                 | 940   | 960   | 8    | 4    | 1 220              | 3 050     | 1,14                | 0,35 | 0,57 | 0,26 | 60                 | 1 100             | 670               |
| 570,2               | 669,8 | 674   | 2,1  | 1    | 270                | 550       | 0,8                 | 0,39 | 0,76 | 0,33 | 12,6               | 1 400             | –                 |
| 574,6               | 665,4 | 671,2 | 3    | 2    | 270                | 550       | 0,8                 | 0,39 | 0,76 | 0,33 | 15,2               | 1 400             | –                 |
| 572,4               | 667,6 | 674   | 2,5  | 1    | 405                | 865       | 0,8                 | 0,39 | 0,76 | 0,33 | 20,1               | 1 400             | –                 |
| 578                 | 732   | 741,2 | 4    | 2    | 540                | 1 200     | 0,8                 | 0,39 | 0,76 | 0,33 | 26,5               | 1 300             | –                 |
| 578                 | 732   | 741,2 | 4    | 2    | 655                | 1 460     | 0,8                 | 0,39 | 0,76 | 0,33 | 32,5               | 1 300             | –                 |
| 583                 | 797   | 807,6 | 5    | 2,5  | 930                | 2 280     | 0,8                 | 0,39 | 0,76 | 0,33 | 47,5               | 600               | –                 |
| 600                 | 990   | 1 010 | 8    | 4    | 1 320              | 3 400     | 1,14                | 0,35 | 0,57 | 0,26 | 67                 | 1 000             | 630               |
| 612,4               | 717,6 | 724   | 2,5  | 1    | 335                | 735       | 0,8                 | 0,39 | 0,76 | 0,33 | 16,2               | 1 300             | –                 |
| 612,4               | 717,6 | 724   | 3    | 3    | 315                | 670       | 0,8                 | 0,39 | 0,76 | 0,33 | 14,9               | 1 300             | –                 |
| 612,4               | 717,6 | 724   | 2,5  | 1    | 465                | 1 040     | 0,8                 | 0,39 | 0,76 | 0,33 | 22,4               | 1 300             | –                 |
| 618                 | 782   | 791,2 | 4    | 2    | 560                | 1 290     | 0,8                 | 0,39 | 0,76 | 0,33 | 28                 | 1 200             | –                 |
| 618                 | 782   | 791,2 | 4    | 2    | 710                | 1 700     | 0,8                 | 0,39 | 0,76 | 0,33 | 35,5               | 1 200             | –                 |
| 623                 | 847   | 857,6 | 5    | 2,5  | 980                | 2 400     | 0,8                 | 0,39 | 0,76 | 0,33 | 48,5               | 1 100             | –                 |
| 640                 | 1 050 | 1 070 | 8    | 4    | 1 340              | 3 600     | 1,14                | 0,35 | 0,57 | 0,26 | 68                 | 950               | 600               |

# Angular contact ball bearings

Single row

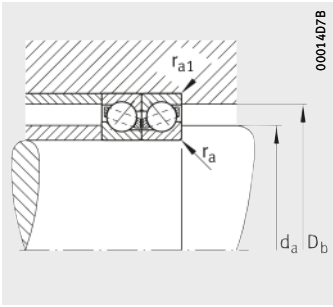


Mounting dimensions

Dimension table (continued) · Dimensions in mm

| Designation                      | Mass<br>m<br>≈ kg | Dimensions |      |     |      |                |                |                |     |    |
|----------------------------------|-------------------|------------|------|-----|------|----------------|----------------|----------------|-----|----|
|                                  |                   | d          | D    | B   | r    | r <sub>1</sub> | D <sub>1</sub> | d <sub>1</sub> | a   | α  |
|                                  |                   |            |      |     | min. | min.           | ≈              | ≈              | ≈   | °  |
| <b>708/630-MPB</b>               | 55                | <b>630</b> | 780  | 48  | 3    | 1,1            | 719,8          | 687,5          | 228 | 30 |
| <b>718/630-MPB</b>               | 71,7              | <b>630</b> | 780  | 69  | 4    | 1,5            | 726,4          | 685,9          | 238 | 30 |
| <b>709/630-MP</b>                | 124               | <b>630</b> | 850  | 71  | 5    | 2              | 763,5          | 712,2          | 249 | 30 |
| <b>719/630-MP</b>                | 168               | <b>630</b> | 850  | 100 | 6    | 3              | 768            | 701,5          | 264 | 30 |
| <b>70/630-MPB</b>                | 297               | <b>630</b> | 920  | 128 | 7,5  | 4              | 805,5          | 742            | 288 | 30 |
| <b>72/630-B-MPB</b>              | 784               | <b>630</b> | 1150 | 165 | 12   | 6              | 938,9          | 849,7          | 456 | 40 |
| <b>708/670-MPB</b>               | 51,6              | <b>670</b> | 820  | 48  | 3    | 1,1            | 759,8          | 727,5          | 239 | 30 |
| <b>718/670-MPB</b>               | 76,2              | <b>670</b> | 820  | 69  | 4    | 1,5            | 766,1          | 725,9          | 250 | 30 |
| <b>709/670-MP</b>                | 142               | <b>670</b> | 900  | 73  | 5    | 2              | 809            | 756,5          | 263 | 30 |
| <b>719/670-MPB</b>               | 184               | <b>670</b> | 900  | 103 | 6    | 3              | 817            | 757,2          | 278 | 30 |
| <b>70/670-MPB</b>                | 314               | <b>670</b> | 980  | 136 | 7,5  | 4              | 869,1          | 790            | 306 | 30 |
| <b>72/670-B-MPB</b>              | 965               | <b>670</b> | 1220 | 175 | 12   | 6              | 993            | 896,7          | 484 | 40 |
| <b>F-801245.SK1<sup>1)</sup></b> | 47,6              | <b>680</b> | 810  | 50  | 3    | 1,1            | 759,8          | 727,5          | 239 | 30 |
| <b>708/710-MPB</b>               | 62,1              | <b>710</b> | 870  | 50  | 4    | 1,5            | 805,4          | 772            | 253 | 30 |
| <b>718/710-MPB</b>               | 93,6              | <b>710</b> | 870  | 74  | 4    | 1,5            | 811,1          | 771            | 265 | 30 |
| <b>709/710-MP</b>                | 167               | <b>710</b> | 950  | 78  | 5    | 2              | 855,5          | 800            | 279 | 30 |
| <b>719/710-MPB</b>               | 181               | <b>710</b> | 950  | 106 | 6    | 3              | 861            | 792            | 293 | 30 |
| <b>70/710-MPB</b>                | 403               | <b>710</b> | 1030 | 140 | 7,5  | 4              | 903,5          | 835            | 321 | 30 |
| <b>72/710-B-MPB</b>              | 1080              | <b>710</b> | 1280 | 180 | 12   | 6              | 1045           | 944,7          | 507 | 40 |
| <b>708/750-MPB</b>               | 80,9              | <b>750</b> | 920  | 54  | 4    | 1,5            | 851,1          | 816            | 273 | 30 |
| <b>718/750-MPB</b>               | 110               | <b>750</b> | 920  | 78  | 5    | 2              | 857,5          | 814,9          | 280 | 30 |
| <b>709/750-MP</b>                | 189               | <b>750</b> | 1000 | 80  | 6    | 3              | 901            | 844            | 293 | 30 |
| <b>719/750-MP</b>                | 216               | <b>750</b> | 1000 | 112 | 6    | 3              | 907            | 836            | 309 | 30 |
| <b>70/750-MPB</b>                | 485               | <b>750</b> | 1090 | 150 | 7,5  | 4              | 956            | 884            | 341 | 30 |
| <b>72/750-B-MPB</b>              | 1340              | <b>750</b> | 1360 | 195 | 15   | 7,5            | 1107           | 1002,7         | 540 | 40 |
| <b>708/800-MPB</b>               | 99,2              | <b>800</b> | 980  | 57  | 4    | 1,5            | 907,4          | 869,4          | 285 | 30 |
| <b>718/800-MPB</b>               | 131               | <b>800</b> | 980  | 82  | 5    | 2              | 914,1          | 868,5          | 298 | 30 |
| <b>709/800-MP</b>                | 214               | <b>800</b> | 1060 | 82  | 6    | 3              | 957            | 898,2          | 310 | 30 |
| <b>719/800-MP</b>                | 242               | <b>800</b> | 1060 | 115 | 6    | 3              | 964            | 885            | 326 | 30 |
| <b>70/800-MPB</b>                | 547               | <b>800</b> | 1150 | 155 | 7,5  | 4              | 1012           | 938            | 339 | 30 |

<sup>1)</sup> With MPB cage.

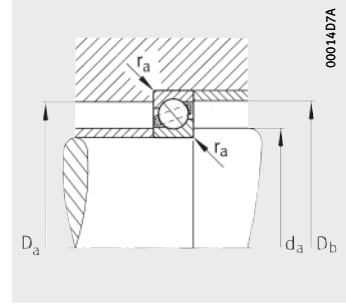
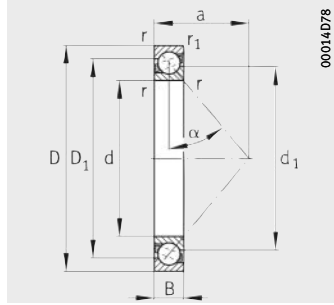


Mounting dimensions

| Mounting dimensions |                |                |                |                 | Basic load ratings  |                       | Calculation factors |      |      |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|----------------|----------------|----------------|-----------------|---------------------|-----------------------|---------------------|------|------|----------------|--------------------|-------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | D <sub>b</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | e                   | X    | Y    | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| min.                | max.           | max.           | max.           | max.            | kN                  | kN                    |                     |      |      |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 642,4               | 767,6          | 774            | 2,5            | 1               | 390                 | 865                   | 0,8                 | 0,39 | 0,76 | 0,33           | 18,4               | 1 200             | –                 |
| 644,6               | 765,4          | 773            | 3              | 1,5             | 540                 | 1 250                 | 0,8                 | 0,39 | 0,76 | 0,33           | 27                 | 1 200             | –                 |
| 648                 | 832            | 841,2          | 4              | 2               | 670                 | 1 630                 | 0,8                 | 0,39 | 0,76 | 0,33           | 33,5               | 1 100             | –                 |
| 653                 | 827            | 837,6          | 5              | 2,5             | 780                 | 1 860                 | 0,8                 | 0,39 | 0,76 | 0,33           | 39                 | 1 100             | –                 |
| 658                 | 892            | 905,4          | 6              | 3               | 1 080               | 2 800                 | 0,8                 | 0,39 | 0,76 | 0,33           | 54                 | 1 100             | –                 |
| 678                 | 1 102          | 1 124          | 10             | 5               | 1 430               | 4 000                 | 1,14                | 0,35 | 0,57 | 0,26           | 74                 | 900               | 530               |
| 682                 | 808            | 814            | 2,5            | 1               | 400                 | 915                   | 0,8                 | 0,39 | 0,76 | 0,33           | 18,9               | 1 100             | –                 |
| 684,6               | 805,4          | 813            | 3              | 1,5             | 560                 | 1 340                 | 0,8                 | 0,39 | 0,76 | 0,33           | 28                 | 1 100             | –                 |
| 688                 | 882            | 891,2          | 4              | 2               | 695                 | 1 730                 | 0,8                 | 0,39 | 0,76 | 0,33           | 35                 | 1 100             | –                 |
| 693                 | 877            | 888            | 5              | 2,5             | 850                 | 2 120                 | 0,8                 | 0,39 | 0,76 | 0,33           | 42,5               | 1 100             | –                 |
| 698                 | 952            | 965,4          | 6              | 3               | 1 200               | 3 200                 | 0,8                 | 0,39 | 0,76 | 0,33           | 61                 | 1 000             | –                 |
| 718                 | 1 172          | 1 194          | 10             | 5               | 1 600               | 4 550                 | 1,14                | 0,35 | 0,57 | 0,26           | 83                 | 850               | 500               |
| 692,4               | 797,6          | 804            | 2,5            | 1               | 400                 | 915                   | 0,8                 | 0,39 | 0,76 | 0,33           | 18,9               | 1 100             | –                 |
| 724,6               | 855,4          | 863            | 3              | 1,5             | 430                 | 1 020                 | 0,8                 | 0,39 | 0,76 | 0,33           | 20,9               | 1 000             | –                 |
| 724,6               | 855,4          | 863            | 3              | 1,5             | 585                 | 1 460                 | 0,8                 | 0,39 | 0,76 | 0,33           | 29,5               | 1 000             | –                 |
| 728                 | 932            | 941,2          | 4              | 2               | 765                 | 1 960                 | 0,8                 | 0,39 | 0,76 | 0,33           | 38                 | 950               | –                 |
| 733                 | 927            | 937,6          | 5              | 2,5             | 900                 | 2 320                 | 0,8                 | 0,39 | 0,76 | 0,33           | 44,5               | 950               | –                 |
| 738                 | 1 002          | 1 015,4        | 6              | 3               | 1 250               | 3 450                 | 0,8                 | 0,39 | 0,76 | 0,33           | 62                 | 950               | –                 |
| 758                 | 1 232          | 1 254          | 10             | 5               | 1 700               | 5 000                 | 1,14                | 0,35 | 0,57 | 0,26           | 87                 | 800               | 480               |
| 764,6               | 905,4          | 913            | 3              | 1,5             | 455                 | 1 120                 | 0,8                 | 0,39 | 0,76 | 0,33           | 22,2               | 600               | –                 |
| 768                 | 902            | 911,2          | 4              | 2               | 640                 | 1 630                 | 0,8                 | 0,39 | 0,76 | 0,33           | 31                 | 950               | –                 |
| 773                 | 977            | 987,6          | 5              | 2,5             | 800                 | 2 120                 | 0,8                 | 0,39 | 0,76 | 0,33           | 42                 | 900               | –                 |
| 773                 | 977            | 987,6          | 5              | 2,5             | 965                 | 2 600                 | 0,8                 | 0,39 | 0,76 | 0,33           | 49,5               | 900               | –                 |
| 778                 | 1 062          | 1 075,4        | 6              | 3               | 1 370               | 3 900                 | 0,8                 | 0,39 | 0,76 | 0,33           | 70                 | 900               | –                 |
| 808                 | 1 302          | 1 328          | 12             | 6               | 1 860               | 5 700                 | 1,14                | 0,35 | 0,57 | 0,26           | 97                 | 750               | 450               |
| 814,6               | 965,4          | 973            | 3              | 1,5             | 510                 | 1 290                 | 0,8                 | 0,39 | 0,76 | 0,33           | 25                 | 900               | –                 |
| 818                 | 962            | 971,2          | 4              | 2               | 710                 | 1 860                 | 0,8                 | 0,39 | 0,76 | 0,33           | 36                 | 900               | –                 |
| 823                 | 1 037          | 1 047,6        | 5              | 2,5             | 830                 | 2 280                 | 0,8                 | 0,39 | 0,76 | 0,33           | 43                 | 850               | –                 |
| 823                 | 1 037          | 1 047,6        | 5              | 2,5             | 1 040               | 2 850                 | 0,8                 | 0,39 | 0,76 | 0,33           | 54                 | 850               | –                 |
| 828                 | 1 122          | 1 135,4        | 6              | 3               | 1 460               | 4 300                 | 0,8                 | 0,39 | 0,76 | 0,33           | 74                 | 850               | –                 |

# Angular contact ball bearings

Single row

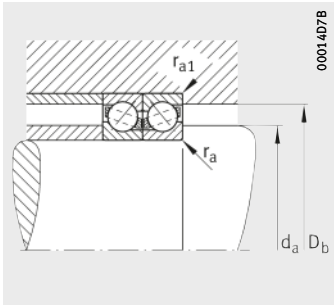


Mounting dimensions

Dimension table (continued) · Dimensions in mm

| Designation                      | Mass<br>m<br>≈ kg | Dimensions  |      |     |      |                |                |     |    |
|----------------------------------|-------------------|-------------|------|-----|------|----------------|----------------|-----|----|
|                                  |                   | d           | D    | B   | r    | r <sub>1</sub> | D <sub>1</sub> | a   | α  |
|                                  |                   |             |      |     | min. | min.           | ≈              | ≈   | °  |
| <b>708/850-MPB</b>               | 93,1              | <b>850</b>  | 1030 | 57  | 4    | 1,5            | 957,4          | 300 | 30 |
| <b>718/850-MPB</b>               | 123               | <b>850</b>  | 1030 | 82  | 5    | 2              | 964,3          | 312 | 30 |
| <b>709/850-MP</b>                | 244               | <b>850</b>  | 1120 | 85  | 6    | 3              | 1013           | 327 | 30 |
| <b>719/850-MPB</b>               | 309               | <b>850</b>  | 1120 | 118 | 6    | 3              | 1022           | 343 | 30 |
| <b>F-804092.SKL<sup>1)</sup></b> | 475               | <b>850</b>  | 1220 | 118 | 7,5  | 7,5            | 1072           | 343 | 30 |
| <b>70/850-MPB</b>                | 652               | <b>850</b>  | 1220 | 165 | 7,5  | 4              | 1074           | 381 | 30 |
| <b>708/900-MPB</b>               | 123               | <b>900</b>  | 1090 | 60  | 5    | 2              | 1013           | 317 | 30 |
| <b>718/900-MPB</b>               | 143               | <b>900</b>  | 1090 | 85  | 5    | 2              | 1019,2         | 330 | 30 |
| <b>709/900-MP</b>                | 276               | <b>900</b>  | 1180 | 88  | 6    | 3              | 1069,5         | 344 | 30 |
| <b>719/900-MP</b>                | 311               | <b>900</b>  | 1180 | 122 | 6    | 3              | 1077           | 361 | 30 |
| <b>70/900-MPB</b>                | 646               | <b>900</b>  | 1280 | 170 | 7,5  | 4              | 1129           | 414 | 30 |
| <b>708/950-MPB</b>               | 144               | <b>950</b>  | 1150 | 63  | 5    | 2              | 1069           | 335 | 30 |
| <b>718/950-MPB</b>               | 168               | <b>950</b>  | 1150 | 90  | 5    | 2              | 1075,5         | 348 | 30 |
| <b>709/950-MP</b>                | 338               | <b>950</b>  | 1250 | 95  | 6    | 3              | 1132           | 365 | 30 |
| <b>719/950-MP</b>                | 455               | <b>950</b>  | 1250 | 132 | 7,5  | 4              | 1139           | 384 | 30 |
| <b>70/950-MPB</b>                | 882               | <b>950</b>  | 1360 | 180 | 7,5  | 4              | 1198,5         | 423 | 30 |
| <b>708/1000-MPB</b>              | 190               | <b>1000</b> | 1220 | 71  | 5    | 2              | 1135           | 356 | 30 |
| <b>718/1000-MPB</b>              | 255               | <b>1000</b> | 1220 | 100 | 6    | 3              | 1142,8         | 370 | 30 |
| <b>709/1000-MP</b>               | 411               | <b>1000</b> | 1320 | 103 | 6    | 3              | 1194           | 386 | 30 |
| <b>719/1000-MP</b>               | 544               | <b>1000</b> | 1320 | 140 | 7,5  | 4              | 1202           | 405 | 30 |
| <b>F-807448.SKL<sup>1)</sup></b> | 659               | <b>1000</b> | 1420 | 130 | 7,5  | 7,5            | 1255,5         | 414 | 30 |
| <b>70/1000-MPB</b>               | 972               | <b>1000</b> | 1420 | 185 | 7,5  | 4              | 1254           | 442 | 30 |
| <b>708/1060-MPB</b>              | 175               | <b>1060</b> | 1280 | 71  | 5    | 2              | 1195           | 373 | 30 |
| <b>718/1060-MPB</b>              | 267               | <b>1060</b> | 1280 | 100 | 6    | 3              | 1198,2         | 388 | 30 |
| <b>709/1060-MP</b>               | 492               | <b>1060</b> | 1400 | 109 | 7,5  | 4              | 1266           | 410 | 30 |
| <b>719/1060-MP</b>               | 653               | <b>1060</b> | 1400 | 150 | 7,5  | 4              | 1273           | 430 | 30 |
| <b>708/1120-MPB</b>              | 253               | <b>1120</b> | 1360 | 78  | 5    | 2              | 1263,5         | 397 | 30 |
| <b>718/1120-MPB</b>              | 312               | <b>1120</b> | 1360 | 106 | 6    | 3              | 1273,5         | 411 | 30 |
| <b>709/1120-MP</b>               | 515               | <b>1120</b> | 1460 | 109 | 7,5  | 4              | 1326           | 427 | 30 |
| <b>719/1120-MP</b>               | 686               | <b>1120</b> | 1460 | 150 | 7,5  | 4              | 1333           | 447 | 30 |

<sup>1)</sup> Separable bearing with MPB cage.

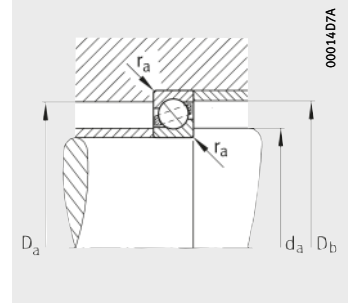
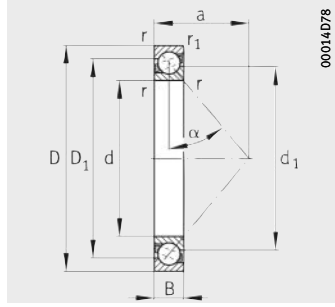


Mounting dimensions

| Mounting dimensions |        |        |       |          | Basic load ratings |                | Calculation factors |      |      |       | Fatigue limit load | Limiting speed    |
|---------------------|--------|--------|-------|----------|--------------------|----------------|---------------------|------|------|-------|--------------------|-------------------|
| $d_a$               | $D_a$  | $D_b$  | $r_a$ | $r_{a1}$ | dyn. $C_r$         | stat. $C_{0r}$ | $e$                 | $X$  | $Y$  | $Y_0$ | $C_{ur}$           | $n_G$             |
| min.                | max.   | max.   | max.  | max.     | kN                 | kN             |                     |      |      |       | kN                 | $\text{min}^{-1}$ |
| 864,6               | 1015,4 | 1023   | 3     | 1,5      | 520                | 1370           | 0,8                 | 0,39 | 0,76 | 0,33  | 25,5               | 850               |
| 868                 | 1012   | 1021,2 | 4     | 2        | 710                | 1930           | 0,8                 | 0,39 | 0,76 | 0,33  | 36,5               | 850               |
| 873                 | 1097   | 1107,6 | 5     | 2,5      | 880                | 2500           | 0,8                 | 0,39 | 0,76 | 0,33  | 45,5               | 800               |
| 873                 | 1097   | 1107,6 | 5     | 2,5      | 1100               | 3150           | 0,8                 | 0,39 | 0,76 | 0,33  | 47                 | 800               |
| 878                 | 1192   | 1192   | 6     | 6        | 1120               | 3350           | 0,8                 | 0,39 | 0,76 | 0,33  | 48,5               | 800               |
| 878                 | 1192   | 1205,4 | 6     | 3        | 1560               | 4800           | 0,8                 | 0,39 | 0,76 | 0,33  | 81                 | 800               |
| 918                 | 1072   | 1081,2 | 4     | 2        | 550                | 1500           | 0,8                 | 0,39 | 0,76 | 0,33  | 27                 | 800               |
| 918                 | 1072   | 1081,2 | 4     | 2        | 765                | 2160           | 0,8                 | 0,39 | 0,76 | 0,33  | 39                 | 800               |
| 923                 | 1157   | 1167,6 | 5     | 2,5      | 965                | 2800           | 0,8                 | 0,39 | 0,76 | 0,33  | 49                 | 750               |
| 923                 | 1157   | 1167,6 | 5     | 2,5      | 1160               | 3450           | 0,8                 | 0,39 | 0,76 | 0,33  | 62                 | 750               |
| 928                 | 1252   | 1265,4 | 6     | 3        | 1600               | 5000           | 0,8                 | 0,39 | 0,76 | 0,33  | 83                 | 750               |
| 968                 | 1132   | 1141,2 | 4     | 2        | 585                | 1660           | 0,8                 | 0,39 | 0,76 | 0,33  | 29,5               | 750               |
| 968                 | 1132   | 1141,2 | 4     | 2        | 830                | 2400           | 0,8                 | 0,39 | 0,76 | 0,33  | 42                 | 750               |
| 973                 | 1227   | 1237,6 | 5     | 2,5      | 1060               | 3250           | 0,8                 | 0,39 | 0,76 | 0,33  | 57                 | 700               |
| 978                 | 1222   | 1235,4 | 6     | 3        | 1270               | 3900           | 0,8                 | 0,39 | 0,76 | 0,33  | 67                 | 700               |
| 978                 | 1332   | 1345,4 | 6     | 3        | 1830               | 6000           | 0,8                 | 0,39 | 0,76 | 0,33  | 95                 | 700               |
| 1018                | 1202   | 1211,2 | 4     | 2        | 680                | 2000           | 0,8                 | 0,39 | 0,76 | 0,33  | 34                 | 700               |
| 1023                | 1197   | 1207,6 | 5     | 2,5      | 950                | 2850           | 0,8                 | 0,39 | 0,76 | 0,33  | 48,5               | 700               |
| 1023                | 1297   | 1307,6 | 5     | 2,5      | 1120               | 3450           | 0,8                 | 0,39 | 0,76 | 0,33  | 57                 | 700               |
| 1028                | 1292   | 1305,4 | 6     | 3        | 1370               | 4300           | 0,8                 | 0,39 | 0,76 | 0,33  | 73                 | 700               |
| 1028                | 1392   | 1392   | 6     | 6        | 1400               | 4550           | 0,8                 | 0,39 | 0,76 | 0,33  | 77                 | 700               |
| 1028                | 1392   | 1405,4 | 6     | 3        | 1860               | 6200           | 0,8                 | 0,39 | 0,76 | 0,33  | 96                 | 700               |
| 1078                | 1262   | 1271,2 | 4     | 2        | 695                | 2120           | 0,8                 | 0,39 | 0,76 | 0,33  | 34,5               | 700               |
| 1083                | 1257   | 1267,6 | 5     | 2,5      | 965                | 3000           | 0,8                 | 0,39 | 0,76 | 0,33  | 50                 | 700               |
| 1088                | 1372   | 1385,4 | 6     | 3        | 1270               | 4150           | 0,8                 | 0,39 | 0,76 | 0,33  | 69                 | 630               |
| 1088                | 1372   | 1385,4 | 6     | 3        | 1460               | 4750           | 0,8                 | 0,39 | 0,76 | 0,33  | 76                 | 630               |
| 1138                | 1342   | 1351,2 | 4     | 2        | 780                | 2450           | 0,8                 | 0,39 | 0,76 | 0,33  | 39                 | 630               |
| 1143                | 1337   | 1347,6 | 5     | 2,5      | 1080               | 3450           | 0,8                 | 0,39 | 0,76 | 0,33  | 55                 | 630               |
| 1148                | 1432   | 1445,4 | 6     | 3        | 1250               | 4150           | 0,8                 | 0,39 | 0,76 | 0,33  | 68                 | 630               |
| 1148                | 1432   | 1445,4 | 6     | 3        | 1500               | 5000           | 0,8                 | 0,39 | 0,76 | 0,33  | 79                 | 630               |

# Angular contact ball bearings

Single row



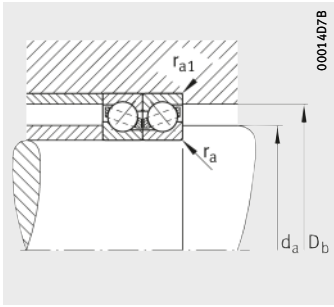
Mounting dimensions

Dimension table (continued) · Dimensions in mm

| Designation                      | Mass<br>m<br>≈ kg | Dimensions   |       |     |      |                |                |     |    |
|----------------------------------|-------------------|--------------|-------|-----|------|----------------|----------------|-----|----|
|                                  |                   | d            | D     | B   | r    | r <sub>1</sub> | D <sub>1</sub> | a   | α  |
|                                  |                   |              |       |     | min. | min.           | ≈              | ≈   | °  |
| <b>708/1180-MPB</b>              | 265               | <b>1 180</b> | 1 420 | 78  | 5    | 2              | 1 323,5        | 414 | 30 |
| <b>718/1180-MPB</b>              | 346               | <b>1 180</b> | 1 420 | 106 | 6    | 3              | 1 330,9        | 428 | 30 |
| <b>709/1180-MP</b>               | 608               | <b>1 180</b> | 1 540 | 115 | 7,5  | 4              | 1 398          | 450 | 30 |
| <b>719/1180-MP</b>               | 816               | <b>1 180</b> | 1 540 | 160 | 7,5  | 4              | 1 406          | 473 | 30 |
| <b>708/1250-MPB</b>              | 299               | <b>1 250</b> | 1 500 | 80  | 6    | 3              | 1 399,1        | 437 | 30 |
| <b>718/1250-MPB</b>              | 382               | <b>1 250</b> | 1 500 | 112 | 6    | 3              | 1 407,2        | 453 | 30 |
| <b>709/1250-MP</b>               | 720               | <b>1 250</b> | 1 630 | 122 | 7,5  | 4              | 1 480          | 477 | 30 |
| <b>719/1250-MP</b>               | 967               | <b>1 250</b> | 1 630 | 170 | 7,5  | 4              | 1 488          | 501 | 30 |
| <b>Z-563415.SKL<sup>1)</sup></b> | 279               | <b>1 300</b> | 1 550 | 80  | 3    | 3              | 1 452          | 451 | 30 |
| <b>708/1320-MPB</b>              | 393               | <b>1 320</b> | 1 600 | 88  | 6    | 3              | 1 486,8        | 465 | 30 |
| <b>718/1320-MPB</b>              | 523               | <b>1 320</b> | 1 600 | 122 | 6    | 3              | 1 496          | 482 | 30 |
| <b>709/1320-MP</b>               | 842               | <b>1 320</b> | 1 720 | 128 | 7,5  | 4              | 1 562          | 503 | 30 |
| <b>719/1320-MP</b>               | 1 110             | <b>1 320</b> | 1 720 | 175 | 7,5  | 4              | 1 571          | 526 | 30 |
| <b>708/1400-MPB</b>              | 481               | <b>1 400</b> | 1 700 | 95  | 6    | 3              | 1 579,5        | 495 | 30 |
| <b>718/1400-MPB</b>              | 644               | <b>1 400</b> | 1 700 | 132 | 7,5  | 4              | 1 589          | 513 | 30 |
| <b>719/1400-MPB</b>              | 1 230             | <b>1 400</b> | 1 820 | 185 | 9,5  | 5              | 1 670          | 557 | 30 |
| <b>718/1500-MPB</b>              | 782               | <b>1 500</b> | 1 820 | 140 | 7,5  | 4              | 1 701,6        | 549 | 30 |
| <b>719/1500-MP</b>               | 1 590             | <b>1 500</b> | 1 950 | 195 | 9,5  | 5              | 1 784          | 596 | 30 |
| <b>718/1600-MPB</b>              | 1 010             | <b>1 600</b> | 1 950 | 155 | 7,5  | 4              | 1 820,6        | 590 | 30 |
| <b>718/1700-MPB</b>              | 1 130             | <b>1 700</b> | 2 060 | 160 | 7,5  | 4              | 1 926,5        | 623 | 30 |
| <b>718/1800-MPB</b>              | 1 300             | <b>1 800</b> | 2 180 | 165 | 9,5  | 5              | 2 040,7        | 657 | 30 |
| <b>718/1900-MPB</b>              | 1 540             | <b>1 900</b> | 2 300 | 175 | 9,5  | 5              | 2 152,8        | 694 | 30 |
| <b>718/2000-MPB</b>              | 1 830             | <b>2 000</b> | 2 430 | 190 | 9,5  | 5              | 2 277,5        | 734 | 30 |

<sup>1)</sup> With MPB cage.

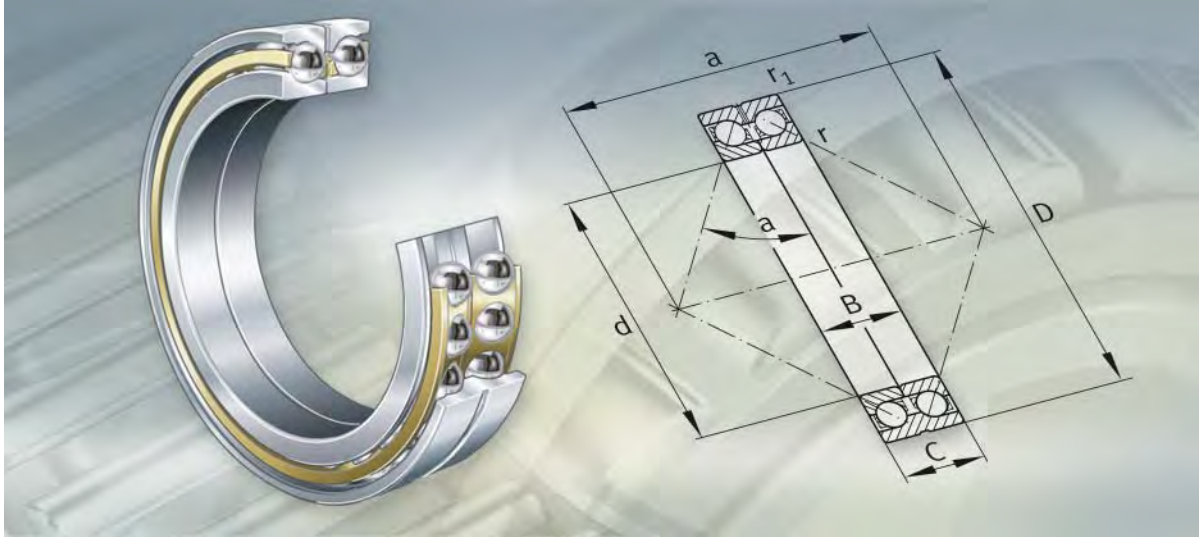




Mounting dimensions

| Mounting dimensions |         |         |       |          | Basic load ratings |                   | Calculation factors |      |      |       | Fatigue limit load | Limiting speed    |
|---------------------|---------|---------|-------|----------|--------------------|-------------------|---------------------|------|------|-------|--------------------|-------------------|
| $d_a$               | $D_a$   | $D_b$   | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ | e                   | X    | Y    | $Y_0$ | $C_{ur}$           | $n_G$             |
| min.                | max.    | max.    | max.  | max.     | kN                 | kN                |                     |      |      |       | kN                 | $\text{min}^{-1}$ |
| 1 198               | 1 402   | 1 411,2 | 4     | 2        | 800                | 2 550             | 0,8                 | 0,39 | 0,76 | 0,33  | 40                 | 630               |
| 1 203               | 1 397   | 1 407,6 | 5     | 2,5      | 1 100              | 3 600             | 0,8                 | 0,39 | 0,76 | 0,33  | 56                 | 630               |
| 1 208               | 1 512   | 1 525,4 | 6     | 3        | 1 340              | 4 550             | 0,8                 | 0,39 | 0,76 | 0,33  | 71                 | 600               |
| 1 208               | 1 512   | 1 525,4 | 6     | 3        | 1 630              | 5 700             | 0,8                 | 0,39 | 0,76 | 0,33  | 89                 | 600               |
| 1 273               | 1 477   | 1 487,6 | 5     | 2,5      | 830                | 2 750             | 0,8                 | 0,39 | 0,76 | 0,33  | 42                 | 600               |
| 1 273               | 1 477   | 1 487,6 | 5     | 2,5      | 1 180              | 4 000             | 0,8                 | 0,39 | 0,76 | 0,33  | 61                 | 600               |
| 1 278               | 1 602   | 1 615,4 | 6     | 3        | 1 500              | 5 400             | 0,8                 | 0,39 | 0,76 | 0,33  | 80                 | 560               |
| 1 278               | 1 602   | 1 615,4 | 6     | 3        | 1 760              | 6 400             | 0,8                 | 0,39 | 0,76 | 0,33  | 95                 | 560               |
| 1 312,4             | 1 537,6 | 1 537,6 | 2,5   | 2,5      | 720                | 2 320             | 0,8                 | 0,39 | 0,76 | 0,33  | 35,5               | 560               |
| 1 343               | 1 577   | 1 587,6 | 5     | 2,5      | 950                | 3 250             | 0,8                 | 0,39 | 0,76 | 0,33  | 49,5               | 560               |
| 1 343               | 1 577   | 1 587,6 | 5     | 2,5      | 1 340              | 4 750             | 0,8                 | 0,39 | 0,76 | 0,33  | 72                 | 560               |
| 1 348               | 1 692   | 1 705,4 | 6     | 3        | 1 560              | 5 700             | 0,8                 | 0,39 | 0,76 | 0,33  | 84                 | 530               |
| 1 348               | 1 692   | 1 705,4 | 6     | 3        | 1 900              | 6 950             | 0,8                 | 0,39 | 0,76 | 0,33  | 102                | 530               |
| 1 423               | 1 677   | 1 687,6 | 5     | 2,5      | 1 100              | 3 900             | 0,8                 | 0,39 | 0,76 | 0,33  | 56                 | 530               |
| 1 428               | 1 672   | 1 685,4 | 6     | 3        | 1 500              | 5 500             | 0,8                 | 0,39 | 0,76 | 0,33  | 80                 | 530               |
| 1 434               | 1 786   | 1 802   | 8     | 4        | 2 040              | 7 800             | 0,8                 | 0,39 | 0,76 | 0,33  | 115                | 530               |
| 1 528               | 1 792   | 1 805,4 | 6     | 3        | 1 630              | 6 300             | 0,8                 | 0,39 | 0,76 | 0,33  | 89                 | 500               |
| 1 534               | 1 916   | 1 932   | 8     | 4        | 2 320              | 9 300             | 0,8                 | 0,39 | 0,76 | 0,33  | 127                | 500               |
| 1 628               | 1 922   | 1 935,4 | 6     | 3        | 1 860              | 7 500             | 0,8                 | 0,39 | 0,76 | 0,33  | 102                | 500               |
| 1 728               | 2 032   | 2 045,4 | 6     | 3        | 1 900              | 8 000             | 0,8                 | 0,39 | 0,76 | 0,33  | 102                | 480               |
| 1 834               | 2 146   | 2 162   | 8     | 4        | 2 160              | 9 300             | 0,8                 | 0,39 | 0,76 | 0,33  | 118                | 450               |
| 1 934               | 2 266   | 2 282   | 8     | 4        | 2 280              | 10 200            | 0,8                 | 0,39 | 0,76 | 0,33  | 124                | 430               |
| 2 034               | 2 396   | 2 412   | 8     | 4        | 2 400              | 11 000            | 0,8                 | 0,39 | 0,76 | 0,33  | 131                | 380               |

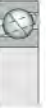
**FAG**



**Double row angular contact ball bearings**

# Double row angular contact ball bearings

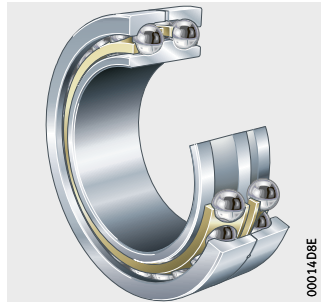
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# Product overview Double row angular contact ball bearings

**Double row**  
Split outer ring

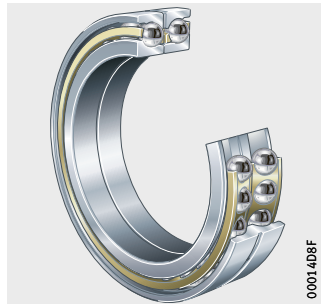
Z-5..SKL2-01



00014D8E

Split inner ring

Z-5..SKL2-02



00014D8F

Split, extended inner ring

Z-5..SKL2-03



00014D90

# Double row angular contact ball bearings

**Features** The double row angular contact ball bearings shown here are self-retaining units with solid inner and outer rings and ball and cage assemblies with cages. Double row angular contact ball bearings are similar in design to a pair of single row angular contact ball bearings in an X arrangement or an O arrangement.

The special bearings with non-standardised main dimensions with the designation Z-5..SKL differ in the design of the bearing rings.

The angular adjustment facility of the double row angular contact ball bearings is very limited.

## Radial and axial load capacity

Double row angular contact ball bearings can support axial forces in both directions and high radial forces. They are particularly suitable for bearing arrangements where rigid axial guidance is required.

The bearings described here are used as axial bearings.



## Bearings with split outer ring

Design 1

- In bearings with a split outer ring and a single-piece inner ring, the rows of balls are in an X arrangement.
- These axial bearings for wire rod roll stands are mounted with radial clearance between the outer ring and chock bore. As a result, the angular contact ball bearings support purely axial forces.
- The contact angle  $\alpha = 40^\circ$ .

## Bearings with split inner ring

Design 2

- These bearings with a split inner ring and single-piece outer ring (O arrangement) are also mounted in wire rod roll stands with radial clearance between the outer ring and chock bore.
- The contact angle  $\alpha = 40^\circ$ .

## Bearings with split, extended inner ring

Design 3

- These double row angular contact ball bearings have the same internal construction as the bearings of Design 2. However, the inner rings are wide than the outer ring. These bearings are used, for example, as axial bearings for oil film bearings.
- The contact angle  $\alpha = 40^\circ$ .

## Sealing

The double row angular contact ball bearings are not sealed.

## Lubrication

The bearings can be lubricated with grease or oil.

## Operating temperature

Double row angular contact ball bearings without seals are suitable for operating temperatures from  $-30^\circ\text{C}$  to  $+150^\circ\text{C}$ .

## Cages

The double row angular contact ball bearings have one solid brass cage for each row of balls.

# Double row angular contact ball bearings

## Design and safety guidelines

### Equivalent dynamic bearing load

Contact angle 40°

For bearings under dynamic loading, the following applies in the case of pure axial load:

$$P = 0,93 \cdot F_a$$

P kN  
Equivalent dynamic bearing load  
F<sub>a</sub> kN  
Axial dynamic bearing load.

## Equivalent static bearing load

Contact angle 40°

For bearings under static loading, the following applies in the case of pure axial load:

$$P_0 = 0,52 \cdot F_{0a}$$

P<sub>0</sub> kN  
Equivalent static load  
F<sub>0a</sub> kN  
Axial static bearing load.

## Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, ball bearings with cage must therefore be subjected to a minimum load of the order of  $P/C_r > 0,01$ .

## Speeds



For these special bearings, the tables only give limiting speeds  $n_G$ . The limiting speed  $n_G$  given in the dimension tables must not be exceeded.

## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

## Mounting dimensions

The dimension tables give the maximum dimension of the radius  $r_a$  and the diameters of the abutment shoulders  $D_a, d_a$ .

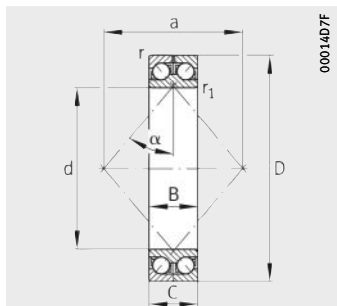
**Accuracy** The main dimensions of the bearings are not standardised. The dimensional and running tolerances correspond to tolerance class PN to DIN 620-2 or better. We can provide the tolerances of the individual bearings in response to an enquiry.

**Axial internal clearance** We can provide the axial internal clearance of the double row angular contact ball bearings in response to an enquiry.

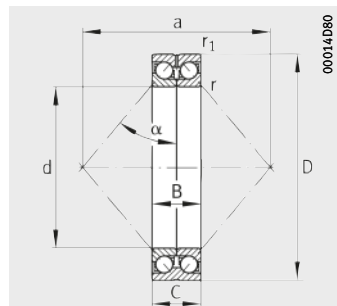


# Angular contact ball bearings

Double row



Design 1:  $\alpha = 40^\circ$



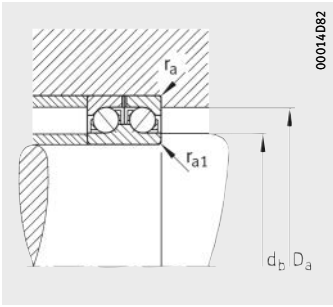
Design 2 and 3:  $\alpha = 40^\circ$

**Dimension table** - Dimensions in mm

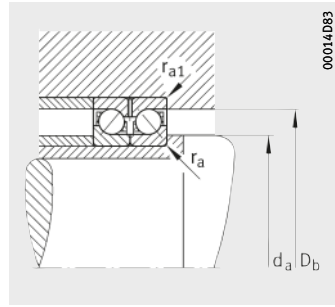
| Designation                | Design | Mass<br>m<br>≈kg | Dimensions |     |         |           |                        |                     |                     |        |
|----------------------------|--------|------------------|------------|-----|---------|-----------|------------------------|---------------------|---------------------|--------|
|                            |        |                  | d          | D   | B/C     | r<br>min. | r <sub>1</sub><br>min. | D <sub>1</sub><br>≈ | d <sub>1</sub><br>≈ | a<br>≈ |
| Z-508732.01.SK1            | 2      | 22               | <b>230</b> | 330 | 80      | 2,1       | 2,1                    | 308,9               | 271                 | 275    |
| Z-573446.SK1               | 1      | 23,9             | <b>230</b> | 330 | 80      | 2,1       | 1,1                    | 308,9               | 254                 | 195    |
| Z-514481.SK1 <sup>1)</sup> | 3      | 18,9             | <b>250</b> | 340 | 76 / 70 | 2,1       | 1,5                    | 320,5               | 286                 | 286    |
| Z-508731.01.SK1            | 2      | 30,5             | <b>260</b> | 370 | 92      | 2,1       | 2,1                    | 348,5               | 305                 | 310    |
| Z-505057.SK1               | 1      | 61,5             | <b>260</b> | 400 | 130     | 4         | 4                      | 373                 | 290                 | 342    |
| Z-508730.01.SK1            | 2      | 32,5             | <b>280</b> | 390 | 92      | 2,1       | 2,1                    | 368,6               | 324                 | 327    |

<sup>1)</sup> The outer ring is 70 mm wide, the split inner ring is 76 mm wide.





Mounting dimensions  
Design 1

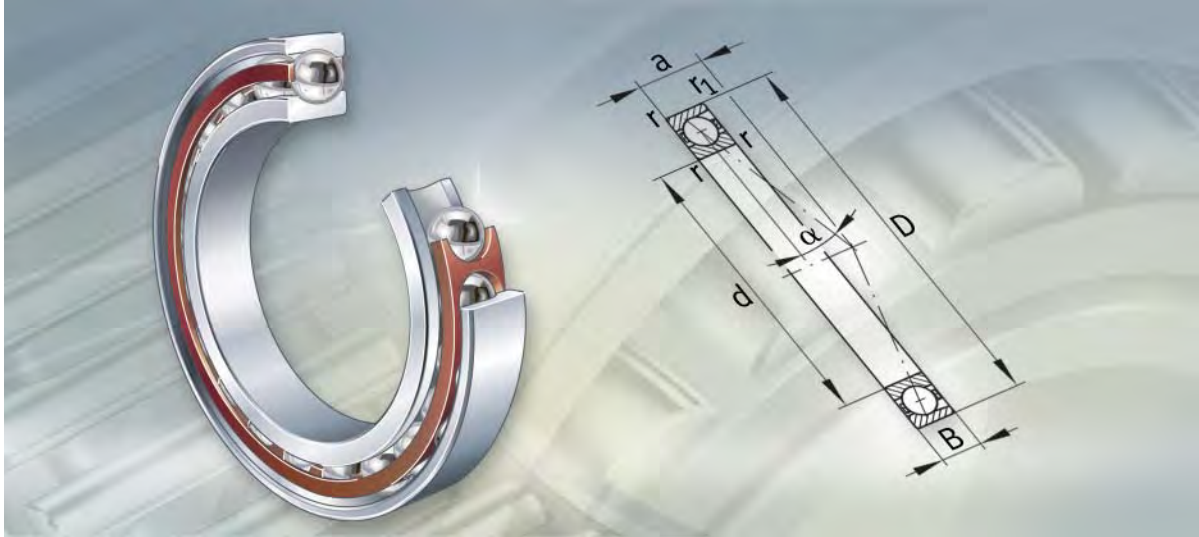


Mounting dimensions  
Design 2 and 3



| Mounting dimensions |       |       |          | Basic load ratings |                   | Fatigue limit load | Limiting speed    |
|---------------------|-------|-------|----------|--------------------|-------------------|--------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ | $C_{ur}$           | $n_G$             |
| min.                | max.  | max.  | max.     | kN                 | kN                | kN                 | $\text{min}^{-1}$ |
| 240                 | 319,5 | 2,1   | 2,1      | 320                | 530               | 17,3               | 1 600             |
| 236                 | 319,5 | 2,1   | 1        | 320                | 530               | 17,8               | 1 600             |
| 260                 | 333   | 2,1   | 1,5      | 300                | 510               | 15,8               | 1 600             |
| 270                 | 359,5 | 2,1   | 2,1      | 390                | 695               | 22,2               | 1 500             |
| 277                 | 383   | 3     | 3        | 540                | 1 020             | 30                 | 1 400             |
| 290                 | 379,5 | 2,1   | 2,1      | 405                | 750               | 23,2               | 1 400             |

**FAG**



## Spindle bearings

# Spindle bearings

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# Product overview Spindle bearings

## Standard spindle bearings

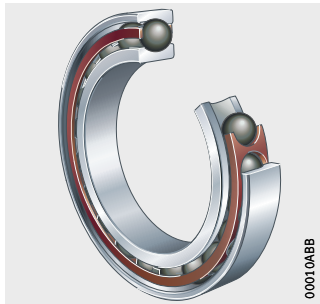
B719, B70, B72



00010AA0

## With ceramic balls

HCB719



00010AB0

# Spindle bearings

**Features** Spindle bearings are single row angular contact ball bearings, comprising solid inner and outer rings and ball and cage assemblies with solid window cages. They are not separable.

Spindle bearings have restricted tolerances. They are particularly suitable for bearing arrangements with very high requirements for guidance accuracy and high speeds. They have proved extremely suitable for main spindle bearing arrangements in machine tools.

A detailed description of spindle bearings (designs, calculation, lubrication, speeds, fits) is given in Catalogue SP 1, Super Precision Bearings.

## Radial and axial load capacity

The bearings can support axial forces in one direction as well as radial forces. Spindle bearings used in an O or X arrangement can support axial forces in both directions and moments. Bearings in a tandem arrangement can only support axial loads in one direction. Spindle bearings are available with a contact angle  $\alpha = 15^\circ$  (suffix C) or  $\alpha = 25^\circ$  (suffix E).

## Standard spindle bearings

Standard spindle bearings B70, B719 and B72 have steel balls.

### With ceramic balls

Spindle bearings HCB719 have balls in standard sizes made from ceramic (hybrid bearings).

### Sealing

Large spindle bearings are of an open design.

### Lubrication

The bearings can be lubricated with grease or oil.

## Universal design

Spindle bearings of the universal design can be mounted in any arrangement or combined in various sets without any loss of performance. The position of the contact cone is marked on the cylindrical surface of the outer ring.

Bearings with the suffix UL are designed for slight preload in an X or O arrangement.



The preload is altered by mounting and the operating conditions.

## Ordering data

When ordering, the number of individual bearings must be stated.



# Spindle bearings

## Operating temperature



The bearings are suitable for operating temperatures from  $-30\text{ °C}$  to  $+100\text{ °C}$ , restricted by the cage material.

The operating temperature must be taken into consideration when selecting the lubricant.

## Cages



Spindle bearings have solid window cages made from laminated fabric (suffix T). The cage is guided on the outer ring.

Check the chemical resistance of the cage material to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of the cages at high temperatures.

The oil change intervals must be observed.

## Suffixes

Suffixes for available designs: see table.

## Available designs

| Suffix | Description   | Design   |
|--------|---|----------|
| C      | Contact angle $15^\circ$  | Standard |
| E      | Contact angle $25^\circ$  |          |
| H      | High preload <sup>1)</sup>  |          |
| L      | Slight preload <sup>1)</sup>  |          |
| M      | Moderate preload <sup>1)</sup>  |          |
| P4S    | Tolerance class P4S   |          |
| T      | Solid window cage made from laminated fabric  |          |
| UL     | Universal design, for example for mounting in pairs, bearing pair has slight preload in O and X arrangement |          |

<sup>1)</sup> For preload values, see Catalogue SP1, Super Precision Bearings.

## Design and safety guidelines

### Operating life

High precision bearings must guide machine parts with very high precision and support forces at up to very high speeds.

They are selected predominantly from the perspectives of:

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners.

Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life  $L_{10}$  in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.



# Spindle bearings

## Equivalent static bearing load

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

### Bearings with contact angle 15°

| Load ratio                        | Equivalent static load                       |
|-----------------------------------|--|
| $\frac{F_{0a}}{F_{0r}} \leq 1,09$ | $P_0 = F_{0r}$                               |
| $\frac{F_{0a}}{F_{0r}} > 1,09$    | $P_0 = 0,5 \cdot F_{0r} + 0,46 \cdot F_{0a}$ |

### Bearings with contact angle 25°

| Load ratio                       | Equivalent static load                       |
|----------------------------------|--|
| $\frac{F_{0a}}{F_{0r}} \leq 1,3$ | $P_0 = F_{0r}$                               |
| $\frac{F_{0a}}{F_{0r}} > 1,3$    | $P_0 = 0,5 \cdot F_{0r} + 0,38 \cdot F_{0a}$ |

$P_0$  kN  
Equivalent static bearing load for combined load

$F_{0a}$  kN  
Axial static bearing load

$F_{0r}$  kN  
Radial static bearing load.

## Static load safety factor

In order to maintain the accuracy of the bearings, a static load safety factor  $S_0 > 3$  is required.

$$S_0 = \frac{C_{0r}}{P_0}$$

$C_{0r}$  kN  
Basic static load rating, see dimension tables

$P_0$  kN  
Equivalent static load.

If several bearings are present, the external load is distributed over the individual bearings.

In this case, see Catalogue SP 1, Super Precision Bearings.



- Speeds** The speeds of the bearing arrangements are dependent on:
- the preload of the bearings
  - the elastic or rigid arrangement of the bearings in the spindle
  - mounting as single bearings or in pairs
  - the lubricants
  - the cooling of the bearings.



The speeds stated in the dimension tables are guide values for single bearings under elastic preload and low loads.

The limiting speeds  $n_G$  given in the dimension tables are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

For a more detailed description, see Catalogue SP 1, Super Precision Bearings.

### Universal bearing sets

Universal bearings of the same sort (same bore and outside diameter) are also available as sets. They can be used as required in an O, X or tandem arrangement, *Figure 1 to Figure 3*, page 264.

Sets with slight preload have the following designations:

- duplex (2 bearings): suffix DUL
- triplex (3 bearings): suffix TUL
- quadruplex (4 bearings): suffix QUL.

### Ordering data

When ordering bearings, the number of sets must be stated, not the number of individual bearings.



# Spindle bearings

## Ready-to-fit bearing sets

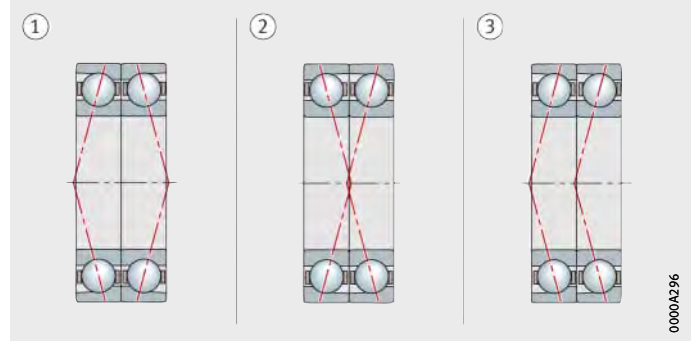
In ready-to-fit bearing sets, the bearings are supplied for use in a specifically defined arrangement.

The bearings must be mounted in the arrangement ordered.



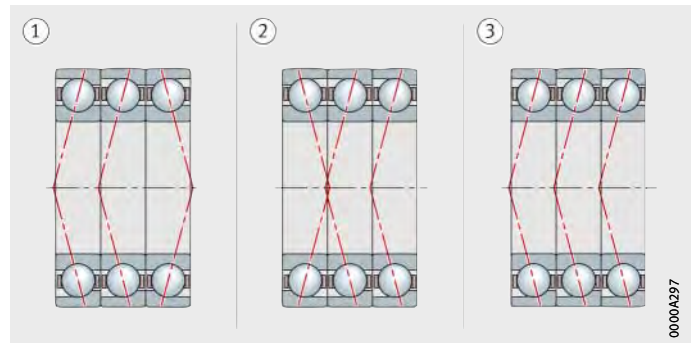
- ① DBL, O arrangement
- ② DFL, X arrangement
- ③ DTL, tandem arrangement

*Figure 1*  
Sets of 2 bearings



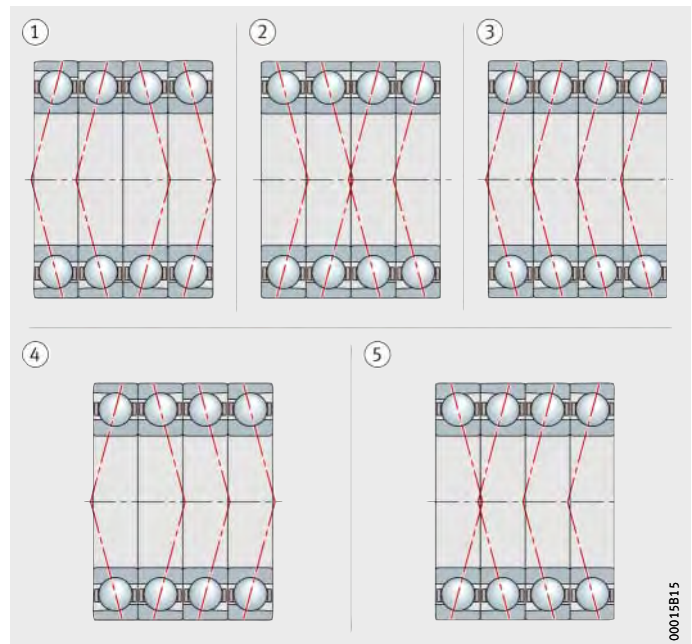
- ① TBTL, combination of O arrangement and tandem arrangement
- ② TFTL, combination of X arrangement and tandem arrangement
- ③ TTL, tandem arrangement

*Figure 2*  
Sets of 3 bearings



- ① QBCL, O arrangement
- ② QFCL, X arrangement
- ③ QTL, tandem arrangement
- ④ QBTL, combination of O arrangement and tandem arrangement
- ⑤ QFTL, combination of X arrangement and tandem arrangement

*Figure 3*  
Sets of 4 bearings



**Ordering example** B7048-C-T-P4S-DBL

Description: two spindle bearings in O arrangement, slight preload.

**Design  
of bearing arrangements  
Shaft and housing tolerances**

For spindle bearings, fits are recommended as a function of the speeds, see Catalogue SP 1, Super Precision Bearings.

**Mounting dimensions**

The bearing tables give the maximum dimensions of the radii  $r_a$  and  $r_{a1}$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .

**Accuracy**

The main dimensions of the bearings correspond to DIN 628-1. The dimensional tolerances of the bearings correspond to tolerance class P4, while the running tolerances correspond to tolerance class P2 to DIN 620-2.

The actual value codes for the bore, outside diameter and bearing width are indicated on the end faces of the inner and outer rings and on the packaging (where they are stated in the sequence “bore, outside diameter, bearing width”).

**Inner ring tolerances**

| Bore    |       | Bore deviation                  |     | Width deviation                |      | Width variation           | Radial runout             | Axial runout           |                           |
|---------|-------|---------------------------------|-----|--------------------------------|------|---------------------------|---------------------------|------------------------|---------------------------|
| d<br>mm |       | $\Delta_{dmp}$<br>$\mu\text{m}$ |     | $\Delta_{Bs}$<br>$\mu\text{m}$ |      | $V_{Bs}$<br>$\mu\text{m}$ | $K_{ia}$<br>$\mu\text{m}$ | $S_d$<br>$\mu\text{m}$ | $S_{ia}$<br>$\mu\text{m}$ |
| over    | incl. |                                 |     |                                |      |                           |                           |                        |                           |
| 150     | 180   | 0                               | -10 | 0                              | -250 | 4                         | 3                         | 4                      | 5                         |
| 180     | 250   | 0                               | -12 | 0                              | -300 | 5                         | 4                         | 5                      | 5                         |
| 250     | 315   | 0                               | -15 | 0                              | -350 | 6                         | 5                         | 6                      | 7                         |
| 315     | 400   | 0                               | -19 | 0                              | -400 | 7                         | 7                         | 7                      | 9                         |
| 400     | 500   | 0                               | -23 | 0                              | -450 | 8                         | 8                         | 8                      | 11                        |
| 500     | 630   | 0                               | -26 | 0                              | -500 | 10                        | 9                         | 10                     | 13                        |

**Outer ring tolerances**

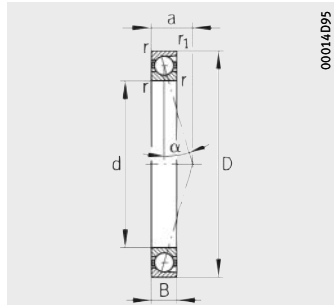
| Outside diameter |       | Outside diameter deviation      |     | Width variation           | Radial runout             | Axial runout           |                           |
|------------------|-------|---------------------------------|-----|---------------------------|---------------------------|------------------------|---------------------------|
| D<br>mm          |       | $\Delta_{Dmp}$<br>$\mu\text{m}$ |     | $V_{Cs}$<br>$\mu\text{m}$ | $K_{ea}$<br>$\mu\text{m}$ | $S_D$<br>$\mu\text{m}$ | $S_{ea}$<br>$\mu\text{m}$ |
| over             | incl. |                                 |     |                           |                           |                        |                           |
| 315              | 400   | 0                               | -15 | 7                         | 8                         | 7                      | 8                         |
| 400              | 500   | 0                               | -18 | 7                         | 9                         | 8                      | 10                        |
| 500              | 630   | 0                               | -22 | 8                         | 11                        | 9                      | 12                        |
| 630              | 800   | 0                               | -26 | 9                         | 13                        | 10                     | 14                        |

The width deviation  $\Delta_{Cs}$  is identical to  $\Delta_{Bs}$  of the corresponding inner ring.

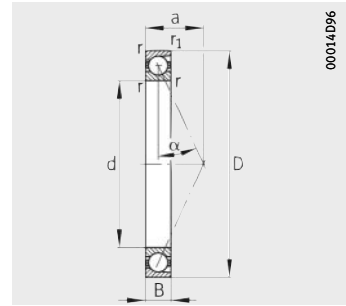


# Spindle bearings

With steel balls



B719...-C, B70...-C, B72...-C  
 $\alpha = 15^\circ$

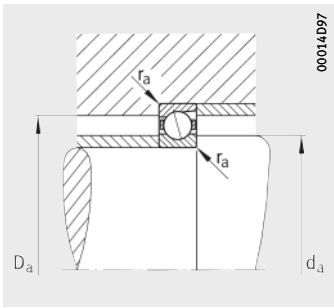


B719...-E, B70...-E, B72...-E  
 $\alpha = 25^\circ$

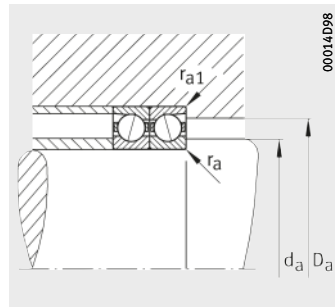
**Dimension table** - Dimensions in mm

| Designation                          | Mass<br>m<br><br>≈ kg | Dimensions |     |    |               |                            |            |
|--------------------------------------|-----------------------|------------|-----|----|---------------|----------------------------|------------|
|                                      |                       | d          | D   | B  | r<br><br>min. | r <sub>1</sub><br><br>min. | a<br><br>≈ |
| <b>B7236-C-T-P4S</b>                 | 16,4                  | <b>180</b> | 320 | 52 | 4             | 4                          | 60         |
| <b>B7236-E-T-P4S</b>                 | 16,3                  | <b>180</b> | 320 | 52 | 4             | 4                          | 84         |
| <b>B7238-C-T-P4S</b>                 | 20                    | <b>190</b> | 340 | 55 | 4             | 4                          | 63         |
| <b>B7238-E-T-P4S</b>                 | 20                    | <b>190</b> | 340 | 55 | 4             | 4                          | 89         |
| <b>B7240-C-T-P4S</b>                 | 24,2                  | <b>200</b> | 360 | 58 | 4             | 4                          | 67         |
| <b>B7240-E-T-P4S</b>                 | 24,2                  | <b>200</b> | 360 | 58 | 4             | 4                          | 94         |
| <b>B7044-C-T-P4S</b>                 | 15,7                  | <b>220</b> | 340 | 56 | 3             | 3                          | 66         |
| <b>B7044-E-T-P4S</b>                 | 15,7                  | <b>220</b> | 340 | 56 | 3             | 3                          | 93         |
| <b>B7244-C-T-P4S</b>                 | 33,1                  | <b>220</b> | 400 | 65 | 4             | 4                          | 74         |
| <b>B7244-E-T-P4S</b>                 | 33,1                  | <b>220</b> | 400 | 65 | 4             | 4                          | 105        |
| <b>HCB71948-C-T-P4S<sup>1)</sup></b> | 5,92                  | <b>240</b> | 320 | 38 | 2,1           | 1,1                        | 57         |
| <b>HCB71948-E-T-P4S<sup>1)</sup></b> | 5,9                   | <b>240</b> | 320 | 38 | 2,1           | 1,1                        | 84         |
| <b>B71948-C-T-P4S</b>                | 7,1                   | <b>240</b> | 320 | 38 | 2,1           | 1,1                        | 57         |
| <b>B71948-E-T-P4S</b>                | 7,08                  | <b>240</b> | 320 | 38 | 2,1           | 1,1                        | 84         |
| <b>B7048-C-T-P4S</b>                 | 16,8                  | <b>240</b> | 360 | 56 | 3             | 3                          | 68         |
| <b>B7048-E-T-P4S</b>                 | 16,7                  | <b>240</b> | 360 | 56 | 3             | 3                          | 98         |
| <b>B71952-C-T-P4S</b>                | 12                    | <b>260</b> | 360 | 46 | 2,1           | 1,1                        | 65         |
| <b>B71952-E-T-P4S</b>                | 11,9                  | <b>260</b> | 360 | 46 | 2,1           | 1,1                        | 95         |
| <b>B71956-C-T-P4S</b>                | 12,8                  | <b>280</b> | 380 | 46 | 2,1           | 1,1                        | 67         |
| <b>B71956-E-T-P4S</b>                | 12,7                  | <b>280</b> | 380 | 46 | 2,1           | 1,1                        | 100        |
| <b>B71960-C-T-P4S</b>                | 20,1                  | <b>300</b> | 420 | 56 | 3             | 1,1                        | 76         |
| <b>B71960-E-T-P4S</b>                | 20                    | <b>300</b> | 420 | 56 | 3             | 1,1                        | 112        |
| <b>B71964-C-T-P4S</b>                | 21,3                  | <b>320</b> | 440 | 56 | 3             | 1,1                        | 79         |
| <b>B71964-E-T-P4S</b>                | 21,3                  | <b>320</b> | 440 | 56 | 3             | 1,1                        | 117        |
| <b>B71968-C-T-P4S</b>                | 22,4                  | <b>340</b> | 460 | 56 | 3             | 1,1                        | 82         |
| <b>B71968-E-T-P4S</b>                | 22,4                  | <b>340</b> | 460 | 56 | 3             | 1,1                        | 121        |
| <b>B71972-C-T-P4S</b>                | 23,6                  | <b>360</b> | 480 | 56 | 3             | 1,1                        | 84         |
| <b>B71972-E-T-P4S</b>                | 23,6                  | <b>360</b> | 480 | 56 | 3             | 1,1                        | 126        |
| <b>B71984-C-T-P4S</b>                | 36,8                  | <b>420</b> | 560 | 65 | 4             | 1,5                        | 98         |
| <b>B71984-E-T-P4S</b>                | 36,8                  | <b>420</b> | 560 | 65 | 4             | 1,5                        | 147        |
| <b>B71992-C-T-P4S</b>                | 55,1                  | <b>460</b> | 620 | 74 | 4             | 1,5                        | 109        |
| <b>B71992-E-T-P4S</b>                | 55                    | <b>460</b> | 620 | 74 | 4             | 1,5                        | 163        |
| <b>B719/500-C-T-P4S</b>              | 67,9                  | <b>500</b> | 670 | 78 | 5             | 2                          | 117        |
| <b>B719/500-E-T-P4S</b>              | 67,9                  | <b>500</b> | 670 | 78 | 5             | 2                          | 175        |

<sup>1)</sup> With ceramic balls.



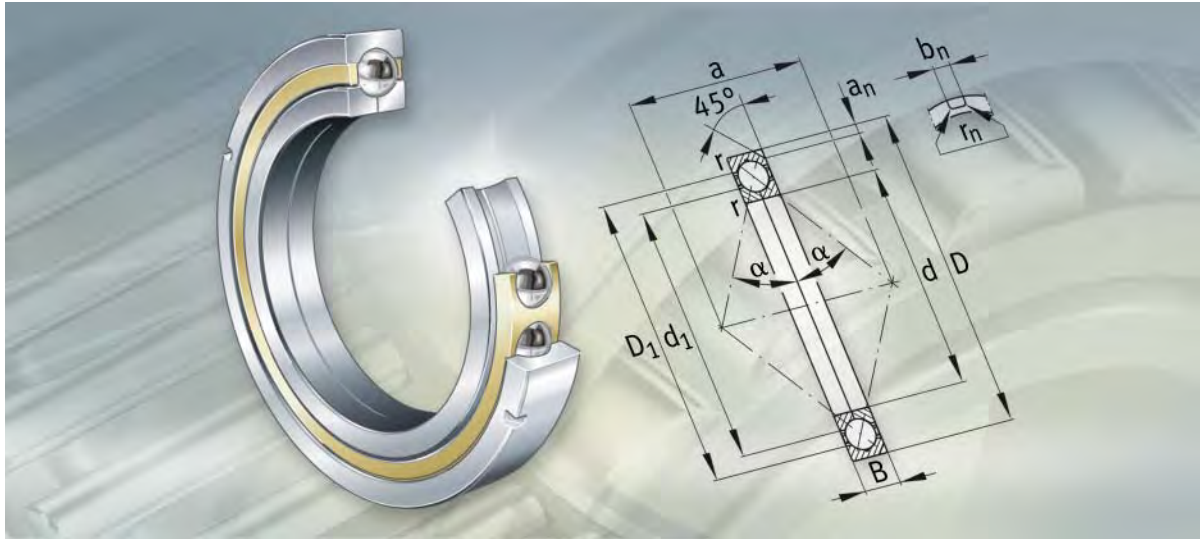
Mounting dimensions



Mounting dimensions

| Mounting dimensions |              |               |                  | Basic load ratings  |                         | Fatigue limit load | Limiting speed                    |                                |
|---------------------|--------------|---------------|------------------|---------------------|-------------------------|--------------------|-----------------------------------|--------------------------------|
| $d_a$<br>h12        | $D_a$<br>H12 | $r_a$<br>max. | $r_{a1}$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{Or}$<br>kN | $C_{ur}$<br>kN     | $n_G$ grease<br>$\text{min}^{-1}$ | $n_G$ oil<br>$\text{min}^{-1}$ |
| 213,5               | 286,5        | 3             | 3                | 305                 | 390                     | 17,6               | 3 800                             | 5 600                          |
| 213,5               | 286,5        | 3             | 3                | 290                 | 365                     | 16,8               | 3 400                             | 5 000                          |
| 223,5               | 306,5        | 3             | 3                | 315                 | 415                     | 18,3               | 3 400                             | 5 000                          |
| 223,5               | 306,5        | 3             | 3                | 300                 | 390                     | 17,4               | 3 200                             | 4 800                          |
| 238,5               | 321,5        | 3             | 3                | 325                 | 440                     | 19                 | 3 200                             | 4 800                          |
| 238,5               | 321,5        | 3             | 3                | 310                 | 415                     | 18                 | 3 000                             | 4 500                          |
| 239                 | 321          | 2,5           | 1                | 325                 | 440                     | 19                 | 3 200                             | 4 800                          |
| 239                 | 321          | 2,5           | 1                | 310                 | 415                     | 18                 | 3 000                             | 4 500                          |
| 264                 | 356          | 3             | 3                | 400                 | 560                     | 23,2               | 2 800                             | 4 300                          |
| 264                 | 356          | 3             | 3                | 380                 | 540                     | 22,1               | 2 600                             | 4 000                          |
| 254                 | 307          | 1             | 1                | 154                 | 215                     | 9,6                | 4 000                             | 6 000                          |
| 254                 | 307          | 1             | 1                | 145                 | 200                     | 9                  | 3 600                             | 5 300                          |
| 254                 | 307          | 1             | 1                | 224                 | 310                     | 13,5               | 3 200                             | 4 800                          |
| 254                 | 307          | 1             | 1                | 212                 | 285                     | 12,8               | 3 000                             | 4 500                          |
| 260                 | 341          | 2,5           | 1                | 335                 | 465                     | 19,5               | 3 000                             | 4 500                          |
| 260                 | 341          | 2,5           | 1                | 315                 | 440                     | 18,5               | 2 800                             | 4 300                          |
| 278                 | 342          | 2,1           | 1                | 285                 | 415                     | 17,1               | 2 800                             | 4 300                          |
| 278                 | 342          | 2,1           | 1                | 270                 | 390                     | 16,2               | 2 600                             | 4 000                          |
| 298                 | 362          | 2,1           | 1                | 300                 | 450                     | 18                 | 2 600                             | 4 000                          |
| 298                 | 362          | 2,1           | 1                | 280                 | 425                     | 17                 | 2 400                             | 3 800                          |
| 322                 | 398          | 1,5           | 1                | 360                 | 570                     | 21,8               | 2 400                             | 3 800                          |
| 322                 | 398          | 1,5           | 1                | 340                 | 540                     | 20,7               | 2 200                             | 3 600                          |
| 342                 | 418          | 1,5           | 1                | 375                 | 620                     | 23,1               | 2 200                             | 3 600                          |
| 342                 | 418          | 1,5           | 1                | 355                 | 585                     | 21,9               | 2 000                             | 3 400                          |
| 362                 | 438          | 1,5           | 1                | 380                 | 640                     | 23,6               | 2 200                             | 3 600                          |
| 362                 | 438          | 1,5           | 1                | 360                 | 610                     | 17,9               | 1 900                             | 3 200                          |
| 382                 | 458          | 1,5           | 1                | 390                 | 695                     | 24,8               | 2 000                             | 3 400                          |
| 382                 | 458          | 1,5           | 1                | 375                 | 640                     | 23,4               | 1 800                             | 3 000                          |
| 444                 | 536          | 1,5           | 1                | 510                 | 980                     | 32,5               | 1 700                             | 2 800                          |
| 444                 | 536          | 1,5           | 1                | 475                 | 915                     | 30,5               | 1 500                             | 2 400                          |
| 493                 | 587          | 1,5           | 1                | 530                 | 1 080                   | 34,5               | 1 500                             | 2 400                          |
| 493                 | 587          | 1,5           | 1                | 500                 | 1 000                   | 32,5               | 1 400                             | 2 200                          |
| 538                 | 632          | 2,5           | 1                | 550                 | 1 160                   | 36,5               | 1 400                             | 2 200                          |
| 538                 | 632          | 2,5           | 1                | 520                 | 1 080                   | 34,5               | 1 200                             | 1 900                          |





**Four point contact bearings**

# Four point contact bearings

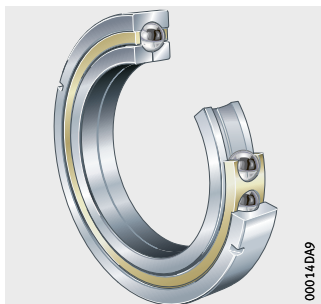
|                                     | Page   |
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## Product overview Four point contact bearings

### With retaining slots

QJ2...-N2, QJ3...-N2,  
QJ10...-N2, QJ19...-N2





# Four point contact bearings

**Features** Four point contact bearings are single row angular contact ball bearings and therefore require significantly less space in an axial direction than double row designs.

The bearings comprise solid outer rings, split inner rings and ball and cage assemblies with brass cages.

The two-piece inner rings allow a large complement of balls to be accommodated. The inner ring halves are matched to the particular bearing and must not be interchanged with those of other bearings of the same size. The outer ring with the ball and cage assembly can be mounted separately from the two inner ring halves.

**Axial load capacity in both directions** Due to the design of the rolling element raceways with their high raceway shoulders, the contact angle of  $35^\circ$  and the large number of rolling elements, four point contact bearings have a high load carrying capacity.

They can support high axial forces in both directions as well as small radial loads.

**With retaining slots in the outer ring** Single row four point contact bearings capable of supporting axial loads in both directions are often combined with a radial bearing and used as an axial bearing with radial clearance in a housing.

For quick and secure location, larger four point contact bearings therefore have two retaining slots in the outer ring offset by  $180^\circ$ . These bearings have the suffix N2.

**Compensation of angular misalignments** The possible skewing of the inner rings in relation to the outer ring depends on the bearing load, the operating clearance and the bearing size and is very small. Four point contact bearings are not therefore suitable for the compensation of angular misalignments in housing bores or due to shaft deflections.

Skewing of the bearing rings increases the running noise, places increased strain on the cages and has a harmful influence on the operating life of the bearings.



# Four point contact bearings

**Sealing** Four point contact bearings are of an open design.

**Lubrication** They are not greased and can be lubricated with grease or oil.

**Operating temperature** Bearings with solid brass cages can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .  
Bearings with an outside diameter of more than 240 mm are dimensionally stable up to  $+200\text{ }^{\circ}\text{C}$ .

**Cages** Four point contact bearings with brass cages have the suffix MPA. These window cages are guided on the outer ring.

**Suffixes** Suffixes for available designs: see table.

## Available designs

| Suffix | Description                                 | Design                                      |
|--------|---|---|
| C3     | Axial internal clearance larger than normal | Special design, available by agreement only |
| MPA    | Solid brass cage                            | Standard                                    |
| N2     | Two retaining slots in outer ring           |   |

**Design and safety guidelines**  
**Equivalent dynamic bearing load**

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

**Load ratio and equivalent dynamic load**

| Load ratio                  | Equivalent dynamic bearing load      |
|-----------------------------|--------------------------------------|
| $\frac{F_a}{F_r} \leq 0,95$ | $P = F_r + 0,66 \cdot F_a$           |
| $\frac{F_a}{F_r} > 0,95$    | $P = 0,6 \cdot F_r + 1,07 \cdot F_a$ |

P kN  
 Equivalent dynamic bearing load for combined load  
 $F_a$  kN  
 Axial dynamic bearing load  
 $F_r$  kN  
 Radial dynamic bearing load.

**Equivalent static bearing load**

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 0,58 \cdot F_{0a}$$

$P_0$  kN  
 Equivalent static bearing load for combined load  
 $F_{0a}$  kN  
 Axial static bearing load  
 $F_{0r}$  kN  
 Radial static bearing load.

**Minimum axial load**

In order to ensure low friction in the bearing, especially at high speeds, a minimum axial load is required. In order to prevent an excessive increase in friction, the axial force should be sufficiently high that the rolling elements are in contact with the inner and outer ring raceway at only one point. This is ensured if  $F_a \geq 1,2 \cdot F_r$ .

**Application as axial bearings only**

If four point contact bearings are to be used as axial bearings only, the outer ring must have a large radial clearance in the housing. As a result, the bearings are not subjected to radial load.



# Four point contact bearings

**Speeds** High speeds can be achieved if four point contact bearings are subjected to purely axial load.

ISO 15 312 does not give thermal reference speeds for these bearings.



The dimension tables therefore only state the limiting speeds  $n_G$ . These values are for oil lubrication and must not be exceeded. If higher speeds are required, please contact us.

## **Design of bearing arrangements Shaft and housing tolerances**

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

## **Mounting dimensions**

The dimension tables give the maximum dimension of the radius  $r_a$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .

**Accuracy** The main dimensions of the bearings correspond to DIN 628-4. The dimensional and running tolerances correspond to tolerance class PN to DIN 620-2.

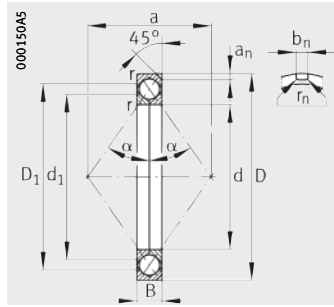
**Axial internal clearance** The axial internal clearance corresponds to internal clearance group CN to DIN 628-4.

**Axial internal clearance**

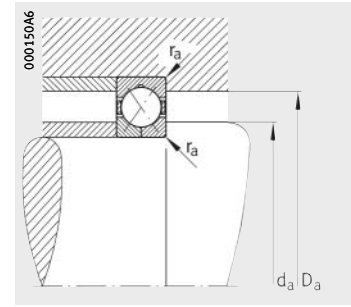
| Bore<br>d<br>mm |       | Axial internal clearance |      |          |      |          |      |          |      |
|-----------------|-------|--------------------------|------|----------|------|----------|------|----------|------|
|                 |       | C2<br>μm                 |      | CN<br>μm |      | C3<br>μm |      | C4<br>μm |      |
| over            | incl. | min.                     | max. | min.     | max. | min.     | max. | min.     | max. |
| 140             | 180   | 90                       | 155  | 135      | 200  | 185      | 250  | 235      | 300  |
| 180             | 220   | 105                      | 175  | 155      | 225  | 210      | 280  | 260      | 330  |
| 220             | 260   | 120                      | 195  | 175      | 250  | 230      | 305  | 290      | 360  |
| 260             | 300   | 140                      | 220  | 200      | 280  | 260      | 340  | 320      | 400  |
| 300             | 355   | 160                      | 240  | 220      | 300  | 280      | 360  | –        | –    |
| 355             | 400   | 180                      | 270  | 250      | 330  | 310      | 390  | –        | –    |
| 400             | 450   | 200                      | 290  | 270      | 360  | 340      | 430  | –        | –    |
| 450             | 500   | 220                      | 310  | 290      | 390  | 370      | 470  | –        | –    |
| 500             | 560   | 240                      | 330  | 310      | 420  | 400      | 510  | –        | –    |



# Four point contact bearings



N2, two retaining slots  
 $\alpha = 35^\circ$



Mounting dimensions

**Dimension table** - Dimensions in mm

| Designation     | Mass<br>m<br><br>≈kg | Dimensions |     |     |      |                |                |     |                |                |                |
|-----------------|----------------------|------------|-----|-----|------|----------------|----------------|-----|----------------|----------------|----------------|
|                 |                      | d          | D   | B   | r    | D <sub>1</sub> | d <sub>1</sub> | a   | a <sub>n</sub> | b <sub>n</sub> | r <sub>n</sub> |
|                 |                      |            |     |     | min. | ≈              | ≈              | ≈   |                |                |                |
| QJ330-N2-MPA    | 28                   | 150        | 320 | 65  | 4    | 261            | 211,3          | 165 | 12,7           | 10,5           | 2              |
| QJ332-N2-MPA    | 32,8                 | 160        | 340 | 68  | 4    | 279,9          | 222,7          | 175 | 12,7           | 10,5           | 2              |
| QJ334-N2-MPA    | 38,4                 | 170        | 360 | 72  | 4    | 292            | 238            | 186 | 12,7           | 10,5           | 2              |
| QJ236-N2-MPA    | 19,6                 | 180        | 320 | 52  | 4    | 269            | 231            | 175 | 12,7           | 10,5           | 2              |
| QJ336-N2-MPA    | 44,9                 | 180        | 380 | 75  | 4    | 311            | 249,1          | 196 | 12,7           | 10,5           | 2              |
| QJ238-N2-MPA    | 23,8                 | 190        | 340 | 55  | 4    | 286,3          | 245,8          | 186 | 12,7           | 10,5           | 2              |
| QJ338-N2-MPA    | 52,1                 | 190        | 400 | 78  | 5    | 327            | 262,5          | 207 | 12,7           | 10,5           | 2              |
| QJ240-N2-MPA    | 28                   | 200        | 360 | 58  | 4    | 302            | 258,6          | 196 | 12,7           | 10,5           | 2              |
| QJ340-N2-MPA    | 58,3                 | 200        | 420 | 80  | 5    | 343,5          | 276,5          | 217 | 15             | 12,5           | 2,5            |
| QJ1044-N2-MPA   | 19,5                 | 220        | 340 | 56  | 3    | 298,5          | 261,4          | 196 | 12,7           | 10,5           | 2              |
| QJ244-N2-MPA    | 38,6                 | 220        | 400 | 65  | 4    | 336            | 284,6          | 217 | 12,7           | 10,5           | 2              |
| QJ344-N2-MPA    | 77,1                 | 220        | 460 | 88  | 5    | 378            | 302            | 238 | 15             | 12,5           | 2,5            |
| QJ1048-N2-MPA   | 21,7                 | 240        | 360 | 56  | 3    | 319,6          | 282,3          | 210 | 12,7           | 10,5           | 2              |
| QJ248-N2-MPA    | 53,1                 | 240        | 440 | 72  | 4    | 367            | 312,5          | 238 | 15             | 12,5           | 2,5            |
| QJ348-N2-MPA    | 98,2                 | 240        | 500 | 95  | 5    | 410            | 330,7          | 259 | 15             | 12,5           | 2,5            |
| QJ1052-N2-MPA   | 32,3                 | 260        | 400 | 65  | 4    | 353            | 309,3          | 231 | 12,7           | 10,5           | 2              |
| QJ1056-N2-MPA   | 34,3                 | 280        | 420 | 65  | 4    | 373            | 329,3          | 245 | 15             | 12,5           | 2,5            |
| QJ1060-N2-MPA   | 48,4                 | 300        | 460 | 74  | 4    | 406            | 356,6          | 266 | 15             | 12,5           | 2,5            |
| QJ260-N2-MPA    | 92,4                 | 300        | 540 | 85  | 5    | 455,8          | 387,3          | 294 | 20             | 15,5           | 3              |
| QJ1064-N2-MPA   | 50,7                 | 320        | 480 | 74  | 4    | 424            | 375,8          | 280 | 15             | 12,5           | 2,5            |
| QJ264-N2-MPA    | 119                  | 320        | 580 | 92  | 5    | 486,5          | 413,3          | 315 | 20             | 15,5           | 3              |
| QJ272-N2-MPA    | 155                  | 360        | 650 | 95  | 6    | 543            | 466,5          | 354 | 25             | 20,5           | 3              |
| QJ1076-N2-MPA   | 74,6                 | 380        | 560 | 82  | 5    | 497            | 443            | 329 | 15             | 12,5           | 2,5            |
| QJ1984-N2-MPA   | 48                   | 420        | 560 | 65  | 4    | 512,2          | 469,2          | 343 | 15             | 12,5           | 2,5            |
| QJ1084-N2-MPA   | 103                  | 420        | 620 | 90  | 5    | 550,2          | 489,8          | 364 | 15             | 12,5           | 2,5            |
| QJ284-N2-MPA    | 192                  | 420        | 760 | 109 | 7,5  | 637,8          | 546,3          | 413 | 25             | 20,5           | 3              |
| QJ1988-N2-MPA   | 66,4                 | 440        | 600 | 74  | 4    | 545,6          | 497            | 364 | 15             | 12,5           | 2,5            |
| QJ1088-N2-MPA   | 115                  | 440        | 650 | 94  | 6    | 579,1          | 514,3          | 382 | 20             | 15,5           | 3              |
| QJ1992-N2-MPA   | 68,1                 | 460        | 620 | 74  | 4    | 565,6          | 517            | 378 | 15             | 12,5           | 2,5            |
| QJ1096-N2-MPA   | 139                  | 480        | 700 | 100 | 6    | 625,8          | 557,7          | 413 | 20             | 15,5           | 3              |
| QJ10/560-N2-MPA | 222                  | 560        | 820 | 115 | 6    | 731            | 652            | 483 | 25             | 20,5           | 3              |



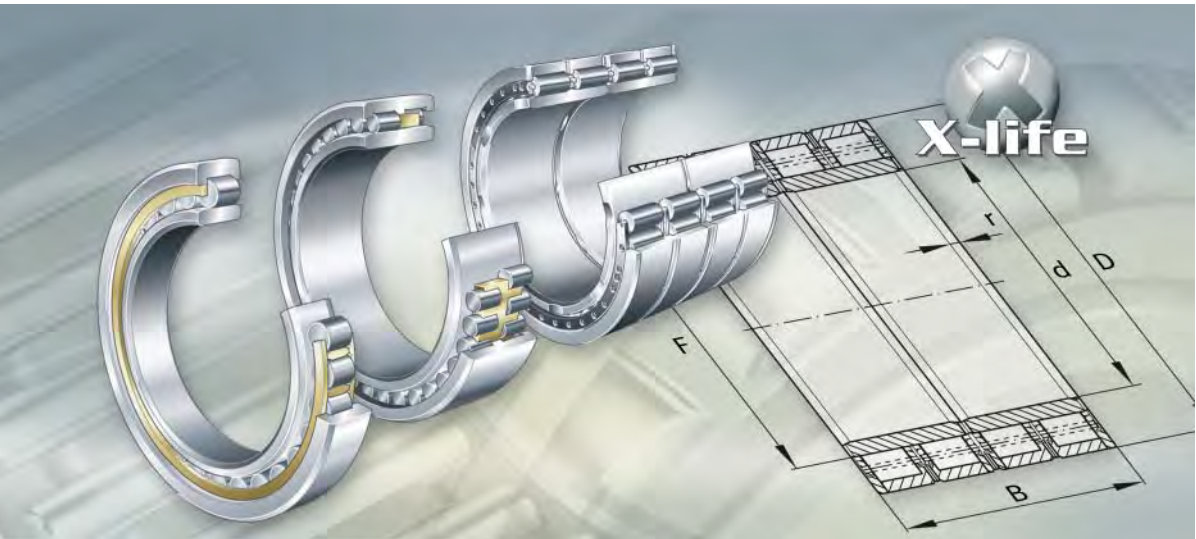
| Mounting dimensions |                |                | Basic load ratings     |                          | Fatigue limit load | Limiting speed    |
|---------------------|----------------|----------------|------------------------|--------------------------|--------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    |
| min.                | max.           | max.           | kN                     | kN                       | kN                 | min <sup>-1</sup> |
| 167                 | 303            | 3              | 510                    | 735                      | 25,5               | 3 800             |
| 177                 | 323            | 3              | 585                    | 865                      | 29,5               | 3 600             |
| 187                 | 343            | 3              | 585                    | 915                      | 24,9               | 3 200             |
| 197                 | 303            | 3              | 430                    | 670                      | 18,9               | 3 600             |
| 197                 | 363            | 3              | 680                    | 1 080                    | 33                 | 3 000             |
| 207                 | 323            | 3              | 455                    | 735                      | 24,4               | 3 200             |
| 210                 | 380            | 4              | 735                    | 1 250                    | 37                 | 2 800             |
| 217                 | 343            | 3              | 510                    | 850                      | 22,6               | 3 000             |
| 220                 | 400            | 4              | 750                    | 1 270                    | 37                 | 2 800             |
| 232,4               | 327,6          | 2,5            | 440                    | 750                      | 22,2               | 3 000             |
| 237                 | 383            | 3              | 630                    | 1 120                    | 31                 | 2 800             |
| 240                 | 440            | 4              | 900                    | 1 660                    | 44,5               | 2 800             |
| 252                 | 348            | 2,5            | 450                    | 780                      | 25                 | 2 800             |
| 257                 | 423            | 3              | 680                    | 1 270                    | 30,5               | 2 800             |
| 260                 | 480            | 4              | 1 020                  | 1 960                    | 52                 | 2 600             |
| 275                 | 385            | 3              | 550                    | 1 020                    | 30,5               | 2 800             |
| 294,6               | 405,4          | 3              | 560                    | 1 080                    | 31,5               | 2 600             |
| 314,6               | 445,4          | 3              | 630                    | 1 250                    | 34                 | 2 400             |
| 320                 | 520            | 4              | 915                    | 1 930                    | 52                 | 2 200             |
| 334,6               | 465,4          | 3              | 640                    | 1 320                    | 33                 | 2 400             |
| 340                 | 560            | 4              | 1 040                  | 2 320                    | 54                 | 1 900             |
| 386                 | 624            | 5              | 1 140                  | 2 700                    | 60                 | 1 600             |
| 398                 | 542            | 4              | 780                    | 1 800                    | 42                 | 1 900             |
| 434,6               | 545,4          | 3              | 620                    | 1 400                    | 34                 | 1 800             |
| 438                 | 602            | 4              | 900                    | 2 160                    | 48                 | 1 600             |
| 452                 | 728            | 6              | 1 430                  | 3 650                    | 82                 | 1 400             |
| 454,6               | 585,4          | 3              | 735                    | 1 760                    | 41,5               | 1 600             |
| 463                 | 627            | 5              | 965                    | 2 400                    | 55                 | 1 500             |
| 474,6               | 605,4          | 3              | 750                    | 1 800                    | 42                 | 1 500             |
| 503                 | 677            | 5              | 1 060                  | 2 750                    | 60                 | 1 400             |
| 583                 | 797            | 5              | 1 320                  | 3 750                    | 77                 | 1 200             |





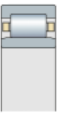


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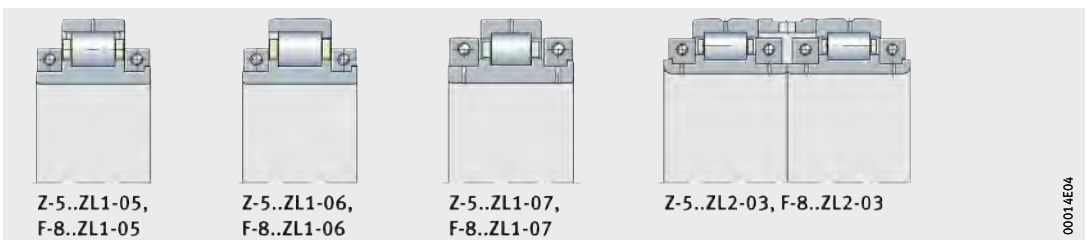
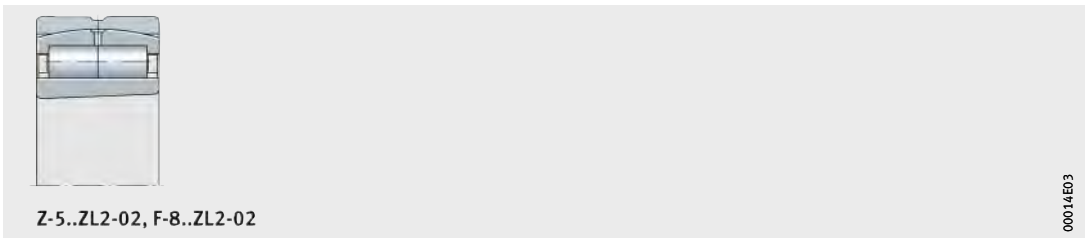
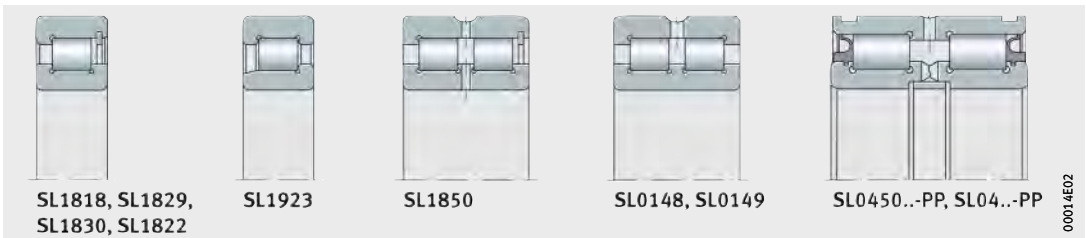
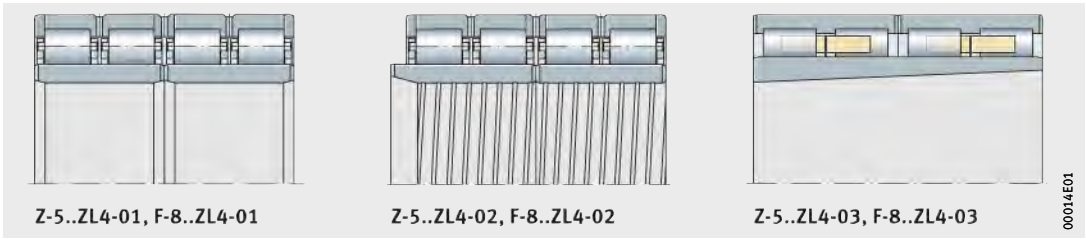
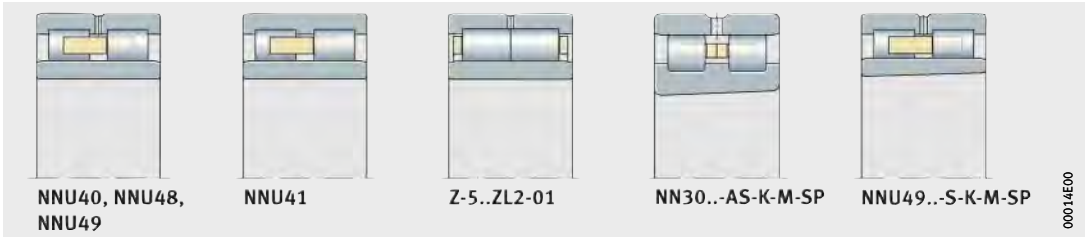
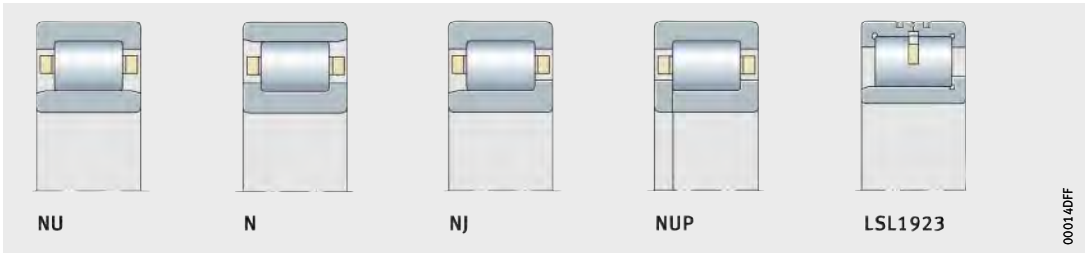
## Cylindrical roller bearings

- Single row, with cage
- Double row, with cage
- Four-row, with cage
- Full complement
- Self-aligning
- Split



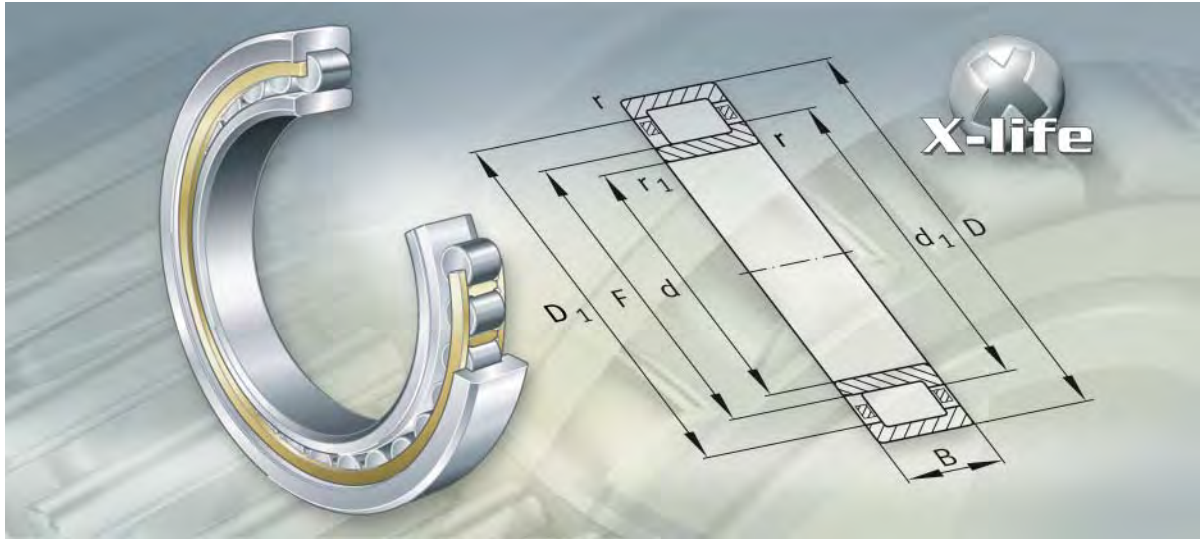
# Cylindrical roller bearings

|  |  |
|--|--|
| <b>X-life</b><br><b>Single row cylindrical roller bearings with cage</b> | ..... 282  |
|  | Single row bearings with cage have very high radial load carrying capacity and are suitable for high speeds. The rollers are guided between rigid ribs by one of the two bearing rings. This ring and the removable ring can be mounted separately. In addition to non-locating, semi-locating and locating bearings with a cylindrical bore, high precision bearings with a tapered bore are also available as non-locating bearings for machine tools.                       |
| <b>Double row cylindrical roller bearings with cage</b>                  | ..... 388  |
|  | These bearings have high load carrying capacity and rigidity. The bearing rings can be mounted separately. Bearings with a cylindrical bore are non-locating bearings and are used, for example, in rolling mills, plastics calenders and large gearboxes. High precision bearings with a tapered bore are used for the radial support of main spindles in machine tools.  |
| <b>Four-row cylindrical roller bearings with cage</b>                    | ..... 414  |
|  | These non-locating bearings can support extremely high radial forces. Special bearings are required for the support of axial forces. The principal areas of application are rolling mills, roll presses and calenders. Bearings with a cylindrical bore are normally designed for a tight fit on the roll journal. Bearings with a tapered bore have a tight fit.  |
| <b>Full complement cylindrical roller bearings</b>                       | ..... 442  |
|  | Full complement bearings have extremely high load capacity and rigidity but cannot achieve speeds as high as those of bearings with a cage. Single row bearings are semi-locating bearings, while double row bearings are available as non-locating, semi-locating and locating bearings, for example for gearboxes. Double row bearings with annular slots in the outer rings are locating bearings. These sealed bearings are highly suitable for cable sheave arrangements. |
| <b>Self-aligning cylindrical roller bearings</b>                         | ..... 464  |
|  | These bearings were specially developed for the dry section of paper machinery. They are ideal as non-locating bearings, allow angular adjustment due to the spherical outer ring and the plain bearing pivot ring and are designed for operating temperatures up to +200 °C. In the case of bearings with a tapered bore, the radial internal clearance can be set precisely.   |
| <b>Split cylindrical roller bearings</b>                                 | ..... 476  |
|  | Split cylindrical roller bearings are used in bearing positions that can only be accessed with difficulty, for example on cranked and very long shafts. The bearing design is matched to the specific application. Single row bearings are available as non-locating, semi-locating and locating bearings. Double row and four-row bearings were developed as locating or non-locating bearings especially for the drive spindles of roll stands.                              |





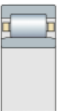
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**Single row cylindrical roller bearings  
with cage**

# Single row cylindrical roller bearings with cage

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|                                     | Super precision cylindrical roller bearings, single row, with tapered bore ..... 386             |



# Product overview **Single row cylindrical roller bearings with cage**

## **Non-locating bearings**

With cylindrical bore

NU10, NU12, NU18, NU19, NU28, NU29, NU30, NU31, NU38, NU39..-E, NU4, NU2..-E, NU3..-E, NU20...-E, NU22...-E, NU23...-E, Z-5..ZL1-01, F-8..ZL1-01



N2..-E, N3..-E, N10, N18, N28, N29, N4, Z-5..ZL1-02, F-8..ZL1-02



With tapered bore

NU10..-K, NU30..-K



N10..-K-M1-SP, N19..-K-M1-SP



## Semi-locating bearings

With cage

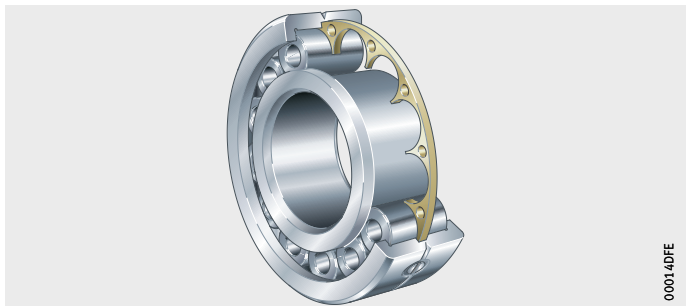
NJ2..-E, NJ3..-E, NJ22..-E, NJ23..-E, NJ4, NJ10, NJ18, NJ19,  
NJ28, NJ29, Z-5..ZL1-03, F-8..ZL1-03



00014DF7

With disc cage

LSL1923



00014DFE

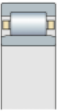
## Locating bearings

With rib washer

NUP2..-E, NUP3..-E, NUP20..-E, NUP22..-E, NUP23..-E, NUP10,  
NUP18, NUP19, NUP28, NUP29, NUP4, Z-5..ZL1-04, F-8..ZL1-04



00014DFA



With L-section ring

NJ2..-E + HJ, NJ3..-E + HJ, NJ22..-E + HJ, NJ23..-E + HJ, NJ4 + HJ,  
NJ10 + HJ, NJ18 + HJ, NJ19 + HJ, NJ28 + HJ, NJ29 + HJ



00014DFB

# Single row cylindrical roller bearings with cage

## Features

Single row cylindrical roller bearings with cage are units comprising solid inner and outer rings and cylindrical roller and cage assemblies. The outer rings have rigid ribs on both sides or no ribs, the inner rings have one or two rigid ribs or are designed without ribs. The cage prevents the cylindrical rollers from coming into contact with each other during rolling.

The cylindrical roller bearings have high rigidity, high radial load carrying capacity and, due to the cage, are suitable for higher speeds than full complement designs. Bearings with the suffix E have a higher capacity roller set and are thus designed for very high load carrying capacity.

The bearings are separable and are therefore easier to mount and dismount. As a result, both bearing rings can be given a tight fit.

Single row cylindrical roller bearings with cage are available as non-locating, semi-locating and locating bearings.

## X-life

Some sizes are supplied in the X-life design. These bearings are indicated in the dimension tables. Bearings of X-life quality have, for example, a lower roughness  $R_a$  and a better geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, these bearings have higher load carrying capacity and longer rating life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed where necessary.

## Non-locating bearings

Cylindrical roller bearings NU and N are non-locating bearings and can support radial forces only. In series NU, the outer ring has two ribs, while the inner ring has no ribs. Bearings of series N have two ribs on the inner ring and an outer ring without ribs.

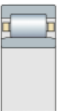
## Special bearings with cylindrical bore

In addition to cylindrical roller bearings with standardised designations and main dimensions, we also supply special bearings. Special bearings of the type NU (Z-5..ZL1-01) are used, for example, in drilling rig equipment. They have chamfers on the inner ring bore and, in some cases, inch dimensions.

Special bearings for high speed tubular stranding machines are of the type N (Z-5..ZL1-02 or F-8..ZL1-02) and have a lubrication groove and three lubrication holes in the outer ring. The robust solid brass cage is guided on the inner ring. In order to reduce the inertia forces, the bearings contain only half as many rollers as normal bearings of the same size. Their load carrying capacity is, however, sufficient for the application. Large bearings have threaded holes for the location of eye bolts for mounting. The bearings for high speed tubular stranding machines have metric main dimensions.



|   |   |
|---|---|
| <b>Super precision bearings with tapered bore</b> | Single row cylindrical roller bearings of series N10..-K-M1-SP and N19..-K-M1-SP are super precision bearings for machine tools. In the case of bearings with a tapered bearing bore (taper 1:12), the radial internal clearance or preload can be set to an optimum value. These bearings are characterised by their high load carrying capacity, high rigidity and excellent accuracy.  |
| <b>Axial displacement</b>                         | The outer and inner ring can be axially displaced relative to each other from the central position by the value “s”.  |
| <b>Semi-locating bearings</b>                     | Cylindrical roller bearings NJ and bearings with disc cage LSL1923 are semi-locating bearings. Semi-locating bearings can support axial forces in one direction as well as high radial forces and can thus guide shafts axially in one direction. They act as non-locating bearings in the opposite direction. The bearings have two ribs on the outer ring and one rib on the inner ring.  |
| <b>Bearings with disc cage</b>                    | <p>Since they have a larger number of rolling elements and larger rolling elements, bearings of series LSL have higher radial and axial load carrying capacity than all comparable cylindrical roller bearing designs with a solid cage. They can withstand high shock loads and vibrations, support large centrifugal forces and allow accelerations up to 500 m/s<sup>2</sup>.</p> <p>Due to the low frictional torque across the entire speed range and the low heat generation, the bearings have the highest limiting speeds of all cylindrical roller bearings. In addition, the optimum heat dissipation ensures thermally stable conditions in the bearing.</p> |
| <b>Bearings with L-section ring</b>               | Non-locating bearings NU can be combined with an L-section ring HJ to form a semi-locating bearing unit. They must not be installed with two L-section rings (due to the risk of jamming).  |
| <b>Axial displacement</b>                         | The outer and inner ring can be axially displaced relative to each other in one direction by the value “s”.   |
| <b>Locating bearings</b>                          | Cylindrical roller bearings NUP and NJ with HJ are locating bearings. Locating bearings can support axial forces in both directions as well as high radial forces and can thus guide shafts axially in both directions.   |
| <b>Bearings with rib washer</b>                   | The design NUP has two ribs on the outer ring and one rigid rib on the inner ring. A loose rib washer is fitted on the opposite side.   |



# Single row cylindrical roller bearings with cage

|                                     |  |
|-------------------------------------|--|
| <b>Bearings with L-section ring</b> | Semi-locating bearings NJ can be combined with an L-section ring HJ to form a locating bearing unit. This design has two ribs on the outer ring, one rib on the inner ring and additionally an L-section ring for the ribless side of the inner ring. The L-section rings suitable for the bearings are indicated in the dimension tables. The bearing and L-section ring must be ordered separately.  |
| <b>L-section rings</b>              | L-section rings are advantageous where, under high loads, the seating surface of the inner ring in bearings of series NUP bearings with a loose rib washer is too small to provide a sufficiently high bearing seat. In some applications, they also make it easier to mount and dismount the bearings.  |
| <b>Sealing</b>                      | The bearings are supplied without seals.   |
| <b>Lubrication</b>                  | The bearings can be lubricated from the end faces using grease or oil.   |
| <b>Operating temperature</b>        | Single row cylindrical roller bearings with cage can be used at operating temperatures from $-30\text{ °C}$ to $+150\text{ °C}$ . For continuous operating temperatures above $+120\text{ °C}$ , please contact us.  |
| <b>Cages</b>                        | The suffix M1 indicates standard bearings with roller-guided brass cages. Further cage suffixes: see table, page 289. Please contact us for information on the cage designs for special bearings.  |
| <b>Disc cage</b>                    | <p>In cylindrical roller bearings LSL1923, an externally-guided flat brass disc cage prevents the cylindrical rollers from coming into contact with each other during rolling.</p> <p>The cage has pockets to accommodate the rolling elements. The rolling elements are guided between the ribs on the outer ring. Due to its low mass, the cage is subjected to only minimal strain under acceleration. It therefore fulfils ideally its role as an element separating the rolling elements and supporting the inertia forces.</p> <p>Lubricant is exchanged via axial through holes. Good oil flow through the axially open bearing is supported by the axial holes.</p> <p>The outer ring is axially split and held together by fasteners.</p> |

## Suffixes Suffixes for available designs of standard bearings: see table.

### Available designs

| Suffix <sup>1)</sup> | Description  | Design                                      |
|----------------------|--|---|
| C3                   | Radial internal clearance larger than normal   | Special design, available by agreement only |
| C4                   | Radial internal clearance larger than C3   |   |
| E                    | Increased capacity design  | Standard                                    |
| EX                   | Increased capacity design, design modified in accordance with standard (parts from these bearings must not be interchanged with parts from bearings of the same size of the previous design E) |   |
| K                    | Tapered bore, taper 1:12   |   |
| M                    | Solid brass cage, two-piece, roller-guided   |   |
| MA                   | Solid brass cage, rib-guided on outer ring   | Special design, available by agreement only |
| MPA                  | Solid brass window cage, rib-guided on outer ring  |   |
| MP1A                 | Solid brass cage, single-piece, rib-guided on outer ring   |   |
| MP1B                 | Solid brass cage, single-piece, rib-guided on inner ring   |   |
| M1                   | Solid brass cage, roller-guided  | Standard                                    |
| M1A                  | Solid brass cage, two-piece, rib-guided on outer ring  | Special design, available by agreement only |
| M1B                  | Solid brass cage, two-piece, rib-guided on inner ring  |   |
| SP                   | Tolerance class SP   | Standard                                    |

<sup>1)</sup> In the case of non-standardised cylindrical roller bearings, the design (for example radial internal clearance, cage, accuracy) is specified in the designation (Z-5 or F-8). In the case of these bearings, additional suffixes are only used for deviations from the original design.



# Single row cylindrical roller bearings with cage

## Design and safety guidelines

### Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

- 4' in bearings of series 10, 12, 18, 19, 2, 3, 4
- 3' in bearings of series 20, 22, 23, 28, 29, 30, 31, 38, 39.

### Axial load carrying capacity

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- tilting of the bearing.



Ribs subjected to load must be supported across their entire height.

The permissible axial load  $F_{a\ per}$  must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load  $F_{a\ max}$  must not be exceeded, in order to avoid impermissible pressures at the contact surfaces.

The ratio  $F_a/F_r$  must not exceed the value 0,4.

Continuous axial loading without simultaneous radial loading is not permissible.

### Permissible and maximum axial load

$$F_{a\ per} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\ max}$$

$$F_{a\ max} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\ per}$  N  
Permissible axial load

$F_{a\ max}$  N  
Axial limiting load

$k_S$  –  
Factor as a function of the lubrication method, see table, page 291

$k_B$  –  
Factor as a function of the bearing series, see table Bearing factor  $k_B$ , page 291

$d_M$  mm  
Mean bearing diameter  $(d + D)/2$ , see dimension table

$n$   $\text{min}^{-1}$   
Operating speed.

**Factor  $k_s$   
for the lubrication method**

| Lubrication method <sup>1)</sup>   | Factor $k_s$ |
|--|--------------|
| Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ( $\nu < 0,5 \cdot \nu_1$ ) | 7,5 to 10    |
| Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow   | 10 to 15     |
| Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)   | 12 to 18     |
| Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ( $\nu > 2 \cdot \nu_1$ ) | 16 to 24     |

<sup>1)</sup> Doped oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

**Bearing factor  $k_B$**

| Series                                 | Factor $k_B$ |
|--|--------------|
| NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E | 15           |
| NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E | 20           |
| NJ4                                    | 22           |

Skewing of the bearing, for example due to shaft deflection, can lead to alternating stresses on the inner ring ribs. In this case, the axial load must be restricted to  $F_{as}$  for bearing tilting of up to max. 2 angular minutes.

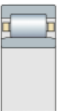
$$F_{as} = 20 \cdot d_M^{1,42}$$

If even greater tilting is present, special strength analysis is required.

**Minimum radial load**

In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{Or}/60$  is necessary.

If  $F_{r \min} < C_{Or}/60$ , please contact us.



# Single row cylindrical roller bearings with cage

## Equivalent dynamic bearing load

### Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

### Semi-locating and locating bearings

If an axial force  $F_a$  is present in addition to the radial force  $F_r$ , the load ratio must be taken into consideration.

### Load ratio and equivalent dynamic load

| Load ratio               | Equivalent dynamic bearing load    |
|--------------------------|------------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r$                          |
| $\frac{F_a}{F_r} > e$    | $P = 0,92 \cdot F_r + Y \cdot F_a$ |

P kN

Equivalent dynamic bearing load for combined load

$F_a$  kN

Axial dynamic bearing load

$F_r$  kN

Radial dynamic bearing load

e, Y -

Factors, see table.

### Factors e and Y

| Series                            | Calculation factors |     |
|-----------------------------------|---------------------|-----|
|                                   | e                   | Y   |
| NJ2, NUP2, NJ3, NUP3, NJ4         | 0,2                 | 0,6 |
| NJ22, NUP22, NJ23, NUP23, LSL1923 | 0,3                 | 0,4 |

## Operating life of high precision bearings

High precision bearings must guide machine parts with high precision and support forces at up to very high speeds.

They are selected predominantly from the perspectives of:

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners.

Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life  $L_{10}$  in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0r}$  kN  
Radial static bearing load.

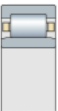
## Static load safety factor of high precision bearings

$$S_0 = \frac{C_{0r}}{P_0}$$

$S_0$  –  
Static load safety factor  
 $C_{0r}$  kN  
Basic static load rating, see dimension tables  
 $P_0$  kN  
Equivalent static bearing load.



In order to achieve sufficiently smooth running, the static load safety factor for high precision bearings should be  $S_0 > 3$ .



# Single row cylindrical roller bearings with cage

## Speeds of high precision bearings



The achievable speed depends on the radial internal clearance while warm from operation.

For calculation, the values from the dimension table are multiplied by the correction factor in the table.

## Correction factors

| Clearance or preload in operation<br>μm |             | Correction factor |
|---|-------------|-------------------|
| 0 to 5                                  | (clearance) | 1 to 1,1          |
| -5 to 0                                 | (preload)   | 0,8 to 1          |



The limiting speeds  $n_G$  given in the dimension tables for high precision bearings are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

## Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Recommendations for machining of the tapered shaft and housing for high precision bearings, see table, page 398.

## Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force locking or form fit.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating point to the abutment shoulder must be designed with rounding to DIN 5418 or an undercut to DIN 509. The minimum values for the chamfer dimensions  $r$  in the dimension tables must be observed.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.



Full support must be provided for ribs transmitting forces in axially loaded bearings.



**Accuracy** The dimensional and running tolerances of the bearings with cylindrical bore correspond to tolerance class PN to DIN 620. Special bearings for tubular stranding machines running at high speeds have increased accuracy to tolerance class P6 or P5. Super precision bearings with a tapered bore correspond to the more stringent tolerance class SP.

**Width tolerances SP**

| Bore    |       | Width deviation<br>(in relation to bore) |      | Width variation<br>$V_{Bs}$<br>$\mu\text{m}$ |
|---------|-------|--|------|--|
| d<br>mm |       | $\Delta_{Bs}$<br>$\mu\text{m}$           |      |  |
| over    | incl. | max.                                     | min. |  |
| 180     | 250   | 0  | -300 | 5  |
| 250     | 315   | 0  | -350 | 6  |
| 315     | 400   | 0  | -400 | 7  |
| 400     | 500   | 0  | -450 | 8  |

**Inner ring tolerances SP**

| Bore    |       | Bore deviation                  |   |   |   | Variation<br>$V_{dp}$<br>$\mu\text{m}$ | Radial runout<br>$K_{ia}$<br>$\mu\text{m}$ | Axial runout           |                           |
|---------|-------|---------------------------------|---|---|---|--|--|------------------------|---------------------------|
| d<br>mm |       | $\Delta_{dmp}$<br>$\mu\text{m}$ |   | $\Delta_{d1mp} - \Delta_{dmp}$<br>$\mu\text{m}$ |   |  |  | $S_d$<br>$\mu\text{m}$ | $S_{ia}$<br>$\mu\text{m}$ |
| over    | incl. |                                 |   |   |   |  |  |                        |                           |
| 180     | 250   | 30                              | 0 | 9   | 0 | 8                                      | 8  | 6                      | 8                         |
| 250     | 315   | 35                              | 0 | 11  | 0 | 9                                      | 9  | 7                      | 10                        |
| 315     | 400   | 40                              | 0 | 12  | 0 | 12                                     | 10   | 9                      | 12                        |
| 400     | 500   | 45                              | 0 | 14  | 0 | 14                                     | 12   | 11                     | 15                        |

**Outer ring tolerances SP**

| Outside diameter |       | Outside diameter deviation     |     | Variation<br>$V_{Dp}$<br>$\mu\text{m}$ | Radial runout<br>$K_{ea}$<br>$\mu\text{m}$ | Axial runout           |                           |
|------------------|-------|--------------------------------|-----|--|--|------------------------|---------------------------|
| D<br>mm          |       | $\Delta_{Ds}$<br>$\mu\text{m}$ |     |  |  | $S_D$<br>$\mu\text{m}$ | $S_{ea}$<br>$\mu\text{m}$ |
| over             | incl. |                                |     |  |  |                        |                           |
| 250              | 315   | 0                              | -18 | 9                                      | 11   | 8                      | 10                        |
| 315              | 400   | 0                              | -20 | 10                                     | 13   | 10                     | 13                        |
| 400              | 500   | 0                              | -23 | 12                                     | 15   | 11                     | 15                        |
| 500              | 630   | 0                              | -28 | 14                                     | 17   | 13                     | 18                        |
| 630              | 800   | 0                              | -35 | 18                                     | 20   | 15                     | 22                        |



# Single row cylindrical roller bearings with cage

## Radial internal clearance

The radial internal clearance of bearings with a cylindrical bore normally corresponds to internal clearance group CN to DIN 620-4. This also applies to special cylindrical roller bearings for stranding machines.

### Radial internal clearance (cylindrical bore)

| Bore<br>d<br>mm |       | Radial internal clearance |      |          |      |          |      |
|-----------------|-------|---------------------------|------|----------|------|----------|------|
|                 |       | CN<br>μm                  |      | C3<br>μm |      | C4<br>μm |      |
| over            | incl. | min.                      | max. | min.     | max. | min.     | max. |
| 140             | 160   | 70                        | 120  | 115      | 165  | 165      | 215  |
| 160             | 180   | 75                        | 125  | 120      | 170  | 170      | 220  |
| 180             | 200   | 90                        | 145  | 140      | 195  | 195      | 250  |
| 200             | 225   | 105                       | 165  | 160      | 220  | 220      | 280  |
| 225             | 250   | 110                       | 175  | 170      | 235  | 235      | 300  |
| 250             | 280   | 125                       | 195  | 190      | 260  | 260      | 330  |
| 280             | 315   | 130                       | 205  | 200      | 275  | 275      | 350  |
| 315             | 355   | 145                       | 225  | 225      | 305  | 305      | 385  |
| 355             | 400   | 190                       | 280  | 280      | 370  | 370      | 460  |
| 400             | 450   | 210                       | 310  | 310      | 410  | 410      | 510  |
| 450             | 500   | 220                       | 330  | 330      | 440  | 440      | 550  |
| 500             | 560   | 240                       | 360  | 360      | 480  | 480      | 600  |
| 560             | 630   | 260                       | 380  | 380      | 500  | 500      | 620  |
| 630             | 710   | 285                       | 425  | 425      | 565  | 565      | 705  |
| 710             | 800   | 310                       | 470  | 470      | 630  | 630      | 790  |
| 800             | 900   | 350                       | 520  | 520      | 690  | 690      | 860  |
| 900             | 1000  | 390                       | 580  | 580      | 770  | 770      | 960  |
| 1000            | 1120  | 430                       | 640  | 640      | 850  | 850      | 1060 |
| 1120            | 1250  | 470                       | 710  | 710      | 950  | 950      | 1190 |
| 1250            | 1400  | 530                       | 790  | 790      | 1050 | 1050     | 1310 |
| 1400            | 1600  | 610                       | 890  | 890      | 1170 | 1170     | 1450 |
| 1600            | 1800  | 700                       | 1020 | 1020     | 1340 | 1340     | 1660 |
| 1800            | 2000  | 760                       | 1120 | 1120     | 1480 | 1480     | 1840 |

Bearings with a tapered bore frequently have a radial internal clearance C3 or C4 to DIN 620-4.

### Radial internal clearance (tapered bore)

| Bore<br>d<br>mm |       | Radial internal clearance |      |          |      |          |      |
|-----------------|-------|---------------------------|------|----------|------|----------|------|
|                 |       | CN<br>μm                  |      | C3<br>μm |      | C4<br>μm |      |
| over            | incl. | min.                      | max. | min.     | max. | min.     | max. |
| 200             | 225   | 155                       | 215  | 200      | 260  | 245      | 305  |
| 225             | 250   | 170                       | 235  | 220      | 285  | 270      | 335  |
| 250             | 280   | 185                       | 255  | 240      | 310  | 295      | 365  |
| 280             | 315   | 205                       | 280  | 265      | 340  | 325      | 400  |
| 315             | 355   | 225                       | 305  | 290      | 370  | 355      | 435  |
| 355             | 400   | 255                       | 345  | 330      | 420  | 405      | 495  |
| 400             | 450   | 285                       | 385  | 370      | 470  | 455      | 555  |
| 450             | 500   | 315                       | 425  | 410      | 520  | 505      | 615  |
| 500             | 560   | 350                       | 470  | 455      | 575  | 560      | 680  |

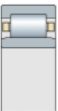
**Radial internal clearance of high precision bearings**

The radial internal clearance of high precision bearings is smaller than the normal internal clearance and corresponds to internal clearance group C1NA.

The internal clearance is not stated in the designation. The bearing rings are not interchangeable.

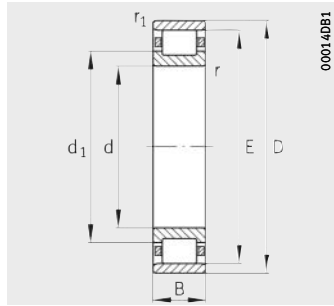
**Radial internal clearance C1NA (tapered bore)**

| Bore<br>d<br>mm |       | Radial internal clearance<br>C1NA<br>μm |      |
|-----------------|-------|---|------|
| over            | incl. | min.                                    | max. |
| 225             | 250   | 65                                      | 100  |
| 250             | 280   | 75                                      | 110  |
| 280             | 315   | 80                                      | 120  |
| 315             | 355   | 90                                      | 135  |
| 355             | 400   | 100                                     | 150  |
| 400             | 450   | 110                                     | 170  |
| 450             | 500   | 120                                     | 190  |

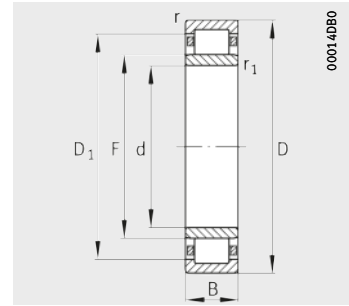


# Cylindrical roller bearings with cage

Single row  
Non-locating bearings



Design 1  
N

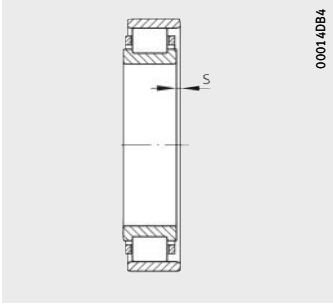


Design 3  
NU

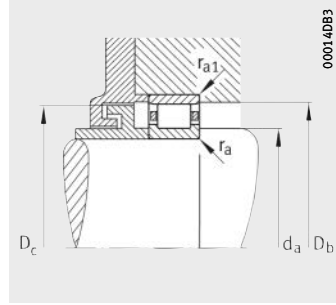
Dimension table - Dimensions in mm

| Designation   | X-life | Design          | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |     |     |                |                |
|---------------|--------|-----------------|------------------|------------|-----|-----|------|----------------|-----------------|-----|-----|----------------|----------------|
|               |        |                 |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>2)</sup> | E   | F   | D <sub>1</sub> | d <sub>1</sub> |
|               |        |                 |                  |            |     |     | min. | min.           |                 |     |     | ≈              | ≈              |
| N426-M1       | -      | 1               | 40,1             | 130        | 340 | 78  | 5    | 5              | 6,2             | 285 | -   | -              | 204,2          |
| NU426-M1      | -      | 3               | 40,6             | 130        | 340 | 78  | 5    | 5              | 6,2             | 285 | 185 | 265,9          | -              |
| N428-M1       | -      | 1               | 46,9             | 140        | 360 | 82  | 5    | 5              | 7,6             | 302 | -   | -              | 218,2          |
| NU428-M1      | -      | 3               | 47,4             | 140        | 360 | 82  | 5    | 5              | 7,6             | 302 | 198 | 282,9          | -              |
| N330-E-M1     | XL     | 1               | 26,9             | 150        | 320 | 65  | 4    | 4              | 5,5             | 283 | -   | -              | 209,5          |
| NU330-E-M1    | XL     | 3               | 27               | 150        | 320 | 65  | 4    | 4              | 5,5             | 283 | 193 | 269,8          | -              |
| NU330-E-M1A   | XL     | 3               | 27               | 150        | 320 | 65  | 4    | 4              | 5,5             | 283 | 193 | 269,8          | -              |
| NU330-E-MP1A  | XL     | 3               | 26,5             | 150        | 320 | 65  | 4    | 4              | 5,5             | 283 | 193 | 269,8          | -              |
| NU330-E-MPA   | XL     | 3               | 27,9             | 150        | 320 | 65  | 4    | 4              | 5,5             | 283 | 193 | 269,8          | -              |
| NU330-E-N-M1  | XL     | 3 <sup>1)</sup> | 27               | 150        | 320 | 65  | 4    | 4              | 5,5             | 283 | 193 | 269,8          | -              |
| N2330-E-M1    | XL     | 1               | 43,3             | 150        | 320 | 108 | 4    | 4              | 9,7             | 283 | -   | -              | 209,5          |
| N2330-E-MP1B  | XL     | 1               | 42,4             | 150        | 320 | 108 | 4    | 4              | 9,7             | 283 | -   | -              | 209,5          |
| NU2330-E-M1   | XL     | 3               | 43,4             | 150        | 320 | 108 | 4    | 4              | 9,7             | 283 | 193 | 269,8          | -              |
| N430-M1       | -      | 1               | 53,9             | 150        | 380 | 85  | 5    | 5              | 8,1             | 317 | -   | -              | 233,2          |
| NU430-M1      | -      | 3               | 54,4             | 150        | 380 | 85  | 5    | 5              | 8,1             | 317 | 213 | 297,9          | -              |
| N332-E-M1     | -      | 1               | 32,6             | 160        | 340 | 68  | 4    | 4              | 5,5             | 300 | -   | -              | 221,6          |
| NU332-E-M1    | -      | 3               | 31,8             | 160        | 340 | 68  | 4    | 4              | 5,6             | 300 | 204 | 286            | -              |
| NU332-E-M1A   | -      | 3               | 31,8             | 160        | 340 | 68  | 4    | 4              | 5,6             | 300 | 204 | 286            | -              |
| NU332-E-MP1A  | -      | 3               | 32               | 160        | 340 | 68  | 4    | 4              | 5,6             | 300 | 204 | 286            | -              |
| N2332-E-M1    | -      | 1               | 51,4             | 160        | 340 | 114 | 4    | 4              | 9,9             | 300 | -   | -              | 221,6          |
| N2332-E-M1B   | -      | 1               | 51,8             | 160        | 340 | 114 | 4    | 4              | 9,9             | 300 | -   | -              | 221,6          |
| NU2332-E-M1   | -      | 3               | 51,5             | 160        | 340 | 114 | 4    | 4              | 9,9             | 300 | 204 | 286            | -              |
| N432-M1       | -      | 1               | 61,5             | 160        | 400 | 88  | 5    | 5              | 8,3             | 334 | -   | -              | 247,2          |
| NU432-M1      | -      | 3               | 61,9             | 160        | 400 | 88  | 5    | 5              | 8,3             | 334 | 226 | 314,9          | -              |
| NU334-E-MPA   | -      | 3               | 38,4             | 170        | 360 | 72  | 4    | 4              | 6               | 318 | 218 | 301,6          | -              |
| N334-E-M1     | -      | 1               | 37,9             | 170        | 360 | 72  | 4    | 4              | 5,9             | 318 | -   | -              | 237            |
| NU334-E-M1    | -      | 3               | 38               | 170        | 360 | 72  | 4    | 4              | 6               | 318 | 218 | 301,6          | -              |
| N2334-EX-M1   | -      | 1               | 61               | 170        | 360 | 120 | 4    | 4              | 10,2            | 320 | -   | -              | 235,7          |
| N2334-EX-MP1B | -      | 1               | 59,9             | 170        | 360 | 120 | 4    | 4              | 10,2            | 320 | -   | -              | 235,7          |
| NU2334-EX-M1  | -      | 3               | 61,4             | 170        | 360 | 120 | 4    | 4              | 10,2            | 320 | 216 | 303            | -              |
| N434-M1       | -      | 1               | 70,4             | 170        | 420 | 92  | 5    | 5              | 8,7             | 351 | -   | -              | 261,2          |
| NU434-M1      | -      | 3               | 71,1             | 170        | 420 | 92  | 5    | 5              | 8,7             | 351 | 239 | 329,9          | -              |

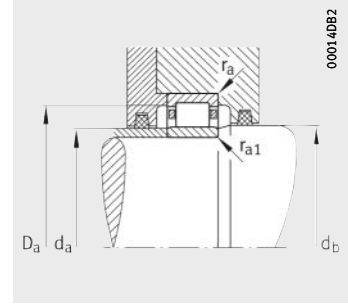
1) With retaining slot in outer ring.



2) Axial displacement "s"  
for N and NU



Mounting dimensions  
for N



Mounting dimensions  
for NU

Mounting dimensions

Basic load ratings

Fatigue  
limit load

Limiting  
speed

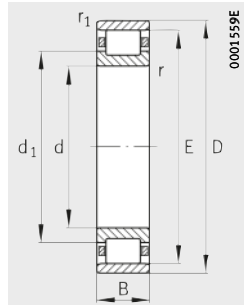
Reference  
speed

| d <sub>a</sub> |      | d <sub>b</sub> | D <sub>a</sub> | D <sub>b</sub> | D <sub>c</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub> | n <sub>G</sub> | n <sub>B</sub> |
|----------------|------|----------------|----------------|----------------|----------------|----------------|-----------------|------------------------|--------------------------|-----------------|----------------|----------------|
| min.           | max. | min.           | max.           | min.           | max.           | max.           | max.            | kN                     | kN                       |                 |                |                |
| 154            | -    | -              | 316            | 287            | 283            | 4              | 4               | 865                    | 1020                     | 114             | 3 200          | 1 900          |
| 154            | 183  | 187            | 316            | -              | -              | 4              | 4               | 865                    | 1020                     | 95              | 3 200          | 1 900          |
| 164            | -    | -              | 336            | 304            | 300            | 4              | 4               | 930                    | 1 120                    | 123             | 3 000          | 1 800          |
| 164            | 195  | 200            | 336            | -              | -              | 4              | 4               | 930                    | 1 120                    | 103             | 3 000          | 1 800          |
| 167            | -    | -              | 303            | 285            | 281            | 3              | 3               | 900                    | 930                      | 126             | 3 600          | 1 940          |
| 167            | 190  | 195            | 303            | -              | -              | 3              | 3               | 900                    | 930                      | 103             | 3 600          | 1 940          |
| 167            | 190  | 195            | 303            | -              | -              | 3              | 3               | 900                    | 930                      | 103             | 3 600          | 1 940          |
| 167            | 190  | 195            | 303            | -              | -              | 3              | 3               | 900                    | 930                      | 93              | 3 600          | 2 000          |
| 167            | 190  | 195            | 303            | -              | -              | 3              | 3               | 900                    | 930                      | 103             | 3 600          | 1 940          |
| 167            | 190  | 195            | 303            | -              | -              | 3              | 3               | 900                    | 930                      | 103             | 3 600          | 2 000          |
| 167            | -    | -              | 303            | 285            | 281            | 3              | 3               | 1 380                  | 1 600                    | 226             | 3 200          | 1 500          |
| 167            | -    | -              | 303            | 285            | 281            | 3              | 3               | 1 380                  | 1 600                    | 226             | 3 200          | 1 500          |
| 167            | 190  | 195            | 303            | -              | -              | 3              | 3               | 1 380                  | 1 600                    | 226             | 3 200          | 1 460          |
| 174            | -    | -              | 356            | 319            | 315            | 4              | 4               | 980                    | 1 220                    | 132             | 2 800          | 1 600          |
| 174            | 210  | 216            | 356            | -              | -              | 4              | 4               | 980                    | 1 220                    | 111             | 2 800          | 1 600          |
| 177            | -    | -              | 323            | 302            | 298            | 3              | 3               | 865                    | 1 060                    | 114             | 3 000          | 1 770          |
| 177            | 200  | 211            | 323            | -              | -              | 3              | 3               | 865                    | 1 060                    | 96              | 3 000          | 1 770          |
| 177            | 200  | 211            | 323            | -              | -              | 3              | 3               | 865                    | 1 060                    | 96              | 3 000          | 1 770          |
| 177            | 200  | 211            | 323            | -              | -              | 3              | 3               | 865                    | 1 060                    | 81              | 3 000          | 1 800          |
| 177            | -    | -              | 323            | 302            | 298            | 3              | 3               | 1 320                  | 1 830                    | 204             | 3 000          | 1 300          |
| 177            | -    | -              | 323            | 302            | 298            | 3              | 3               | 1 320                  | 1 830                    | 204             | 3 000          | 1 300          |
| 177            | 200  | 211            | 323            | -              | -              | 3              | 3               | 1 320                  | 1 830                    | 204             | 3 000          | 1 340          |
| 184            | -    | -              | 376            | 336            | 332            | 4              | 4               | 1 060                  | 1 320                    | 142             | 2 800          | 1 500          |
| 184            | 223  | 230            | 376            | -              | -              | 4              | 4               | 1 060                  | 1 320                    | 118             | 2 800          | 1 500          |
| 187            | 215  | 221            | 343            | -              | -              | 3              | 3               | 915                    | 1 140                    | 98              | 3 000          | 1 670          |
| 187            | -    | -              | 343            | 320            | 316            | 3              | 3               | 965                    | 1 220                    | 132             | 3 000          | 1 610          |
| 187            | 215  | 221            | 343            | -              | -              | 3              | 3               | 965                    | 1 220                    | 105             | 3 000          | 1 610          |
| 187            | -    | -              | 343            | 322            | 318            | 3              | 3               | 1 500                  | 2 080                    | 231             | 2 800          | 1 200          |
| 187            | -    | -              | 343            | 322            | 318            | 3              | 3               | 1 500                  | 2 080                    | 231             | 2 800          | 1 200          |
| 187            | 214  | 218            | 343            | -              | -              | 3              | 3               | 1 500                  | 2 080                    | 231             | 2 800          | 1 210          |
| 194            | -    | -              | 396            | 353            | 349            | 4              | 4               | 1 120                  | 1 400                    | 151             | 2 800          | 1 500          |
| 194            | 236  | 243            | 396            | -              | -              | 4              | 4               | 1 120                  | 1 400                    | 126             | 2 800          | 1 500          |

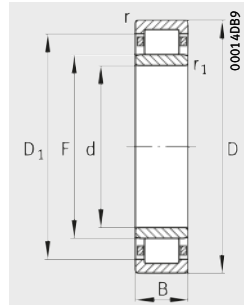


# Cylindrical roller bearings with cage

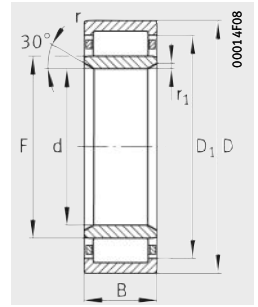
Single row  
Non-locating  
bearings



Design 1  
N



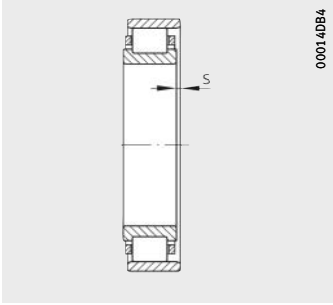
Design 3  
NU



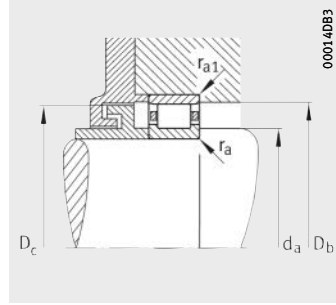
Design 4  
NU

Dimension table (continued) · Dimensions in mm

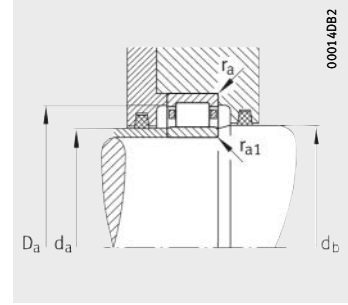
| Designation   | X-life | Design | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |       |       |                |                |
|---------------|--------|--------|------------------|------------|-----|-----|------|----------------|-----------------|-------|-------|----------------|----------------|
|               |        |        |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E     | F     | D <sub>1</sub> | d <sub>1</sub> |
|               |        |        |                  |            |     |     | min. | min.           |                 |       |       | ≈              | ≈              |
| N236-E-M1     | XL     | 1      | 18,9             | 180        | 320 | 52  | 4    | 4              | 4,7             | 289   | –     | –              | 230,2          |
| NU236-E-M1    | XL     | 3      | 18,9             | 180        | 320 | 52  | 4    | 4              | 4,7             | 289   | 217   | 278,6          | –              |
| NU236-E-M1A   | XL     | 3      | 18,9             | 180        | 320 | 52  | 4    | 4              | 4,7             | 289   | 217   | 278,6          | –              |
| NU236-E-MP1A  | XL     | 3      | 18,9             | 180        | 320 | 52  | 4    | 4              | 4,7             | 289   | 217   | 278,6          | –              |
| NU1236-M1     | –      | 3      | 22,2             | 180        | 320 | 62  | 4    | 4              | 4,7             | 293   | 213   | 279,8          | –              |
| NU2236-E-M1   | XL     | 3      | 30,7             | 180        | 320 | 86  | 4    | 4              | 7,2             | 291   | 215   | 280            | –              |
| NU2236-E-M1A  | XL     | 3      | 31,3             | 180        | 320 | 86  | 4    | 4              | 7,2             | 291   | 215   | 280            | –              |
| N336-E-MP1B   | –      | 1      | 42,9             | 180        | 380 | 75  | 4    | 4              | 6,1             | 335   | –     | –              | 250,5          |
| NU336-E-M1    | –      | 3      | 43,9             | 180        | 380 | 75  | 4    | 4              | 6,1             | 335   | 231   | 319,8          | –              |
| NU336-E-M1A   | –      | 3      | 43,9             | 180        | 380 | 75  | 4    | 4              | 6,1             | 335   | 231   | 319,8          | –              |
| NU336-E-MP1A  | –      | 3      | 43,9             | 180        | 380 | 75  | 4    | 4              | 6,1             | 335   | 231   | 319,8          | –              |
| NU336-E-MPA   | –      | 3      | 43,9             | 180        | 380 | 75  | 4    | 4              | 6,1             | 335   | 231   | 319,8          | –              |
| N2336-EX-M1   | –      | 1      | 71,3             | 180        | 380 | 126 | 4    | 4              | 10,5            | 339   | –     | –              | 248            |
| N2336-EX-MP1B | –      | 1      | 69,7             | 180        | 380 | 126 | 4    | 4              | 10,5            | 339   | –     | –              | 248            |
| NU2336-EX-M1  | –      | 3      | 71,8             | 180        | 380 | 126 | 4    | 4              | 10,5            | 339   | 227   | 320,8          | –              |
| NU436-M1      | –      | 3      | 80,9             | 180        | 440 | 95  | 6    | 6              | 8,9             | 370   | 250   | 346,9          | –              |
| NU3138-M1     | –      | 3      | 34,4             | 190        | 320 | 104 | 3    | 3              | 9,2             | 294   | 222   | 282,1          | –              |
| N238-E-M1     | –      | 1      | 22,8             | 190        | 340 | 55  | 4    | 4              | 4,7             | 306   | –     | –              | 244            |
| N238-E-M1B    | –      | 1      | 23               | 190        | 340 | 55  | 4    | 4              | 4,7             | 306   | –     | –              | 244            |
| NU238-E-M1    | –      | 3      | 22,8             | 190        | 340 | 55  | 4    | 4              | 4,7             | 306   | 230   | 295            | –              |
| NU238-E-M1-C3 | –      | 3      | 22,8             | 190        | 340 | 55  | 4    | 4              | 4,7             | 306   | 230   | 295            | –              |
| NU238-E-M1A   | –      | 3      | 22,8             | 190        | 340 | 55  | 4    | 4              | 4,7             | 306   | 230   | 295            | –              |
| NU238-E-MP1A  | –      | 3      | 22,2             | 190        | 340 | 55  | 4    | 4              | 4,7             | 306   | 230   | 295            | –              |
| NU238-E-MPA   | –      | 3      | 22,2             | 190        | 340 | 55  | 4    | 4              | 4,7             | 306   | 230   | 295            | –              |
| NU1238-M1     | –      | 3      | 26,6             | 190        | 340 | 65  | 4    | 4              | 4,8             | 310   | 226   | 296,2          | –              |
| NU2238-E-M1   | –      | 3      | 37,1             | 190        | 340 | 92  | 4    | 4              | 8               | 308   | 228   | 296,4          | –              |
| NU2238-E-M1A  | –      | 3      | 37,9             | 190        | 340 | 92  | 4    | 4              | 8               | 308   | 228   | 296,4          | –              |
| Z-549128.ZL   | –      | 4      | 45,5             | 190        | 340 | 114 | 3    | 8              | 7,6             | 313,1 | 229,1 | 299,2          | –              |
| N338-E-M1     | –      | 1      | 50,5             | 190        | 400 | 78  | 5    | 5              | 6,3             | 353   | –     | –              | 265,4          |
| NU338-E-M1    | –      | 3      | 50,6             | 190        | 400 | 78  | 5    | 5              | 6,3             | 353   | 245   | 336            | –              |
| NU338-E-M1A   | –      | 3      | 50,6             | 190        | 400 | 78  | 5    | 5              | 6,3             | 353   | 245   | 336            | –              |
| N2338-EX-M1   | –      | 1      | 82,5             | 190        | 400 | 132 | 5    | 5              | 11              | 360   | –     | –              | 262,5          |
| N2338-EX-MP1B | –      | 1      | 80,9             | 190        | 400 | 132 | 5    | 5              | 11              | 360   | –     | –              | 262,5          |
| NU2338-EX-M1  | –      | 3      | 83,1             | 190        | 400 | 132 | 5    | 5              | 11              | 360   | 240   | 340,5          | –              |
| NU438-M1      | –      | 3      | 90,6             | 190        | 460 | 98  | 6    | 6              | 9,4             | 385   | 265   | 361,9          | –              |



1) Axial displacement "s"  
for N and NU



Mounting dimensions  
for N



Mounting dimensions  
for NU

Mounting dimensions

Basic load ratings

Fatigue  
limit load

Limiting  
speed

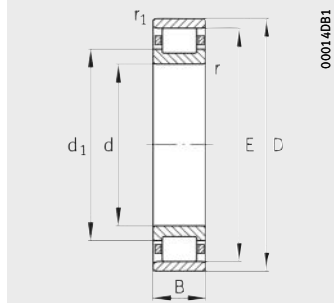
Reference  
speed

| d <sub>a</sub> |       | d <sub>b</sub> | D <sub>a</sub> | D <sub>b</sub> | D <sub>c</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub> | n <sub>G</sub>    | n <sub>B</sub>    |
|----------------|-------|----------------|----------------|----------------|----------------|----------------|-----------------|------------------------|--------------------------|-----------------|-------------------|-------------------|
| min.           | max.  | min.           | max.           | min.           | max.           | max.           | max.            | kN                     | kN                       | kN              | min <sup>-1</sup> | min <sup>-1</sup> |
| 197            | –     | –              | 303            | 292            | 286            | 3              | 3               | 730                    | 830                      | 112             | 3 600             | 1 850             |
| 197            | 214   | 221            | 303            | –              | –              | 3              | 3               | 730                    | 830                      | 93              | 3 600             | 1 850             |
| 197            | 214   | 221            | 303            | –              | –              | 3              | 3               | 730                    | 830                      | 93              | 3 600             | 1 850             |
| 197            | 214   | 221            | 303            | –              | –              | 3              | 3               | 730                    | 830                      | 85              | 3 600             | 1 850             |
| 197            | 210   | 216            | 303            | –              | –              | 3              | –               | 830                    | 910                      | 100             | 3 200             | 2 000             |
| 197            | 214   | 221            | 303            | –              | –              | 3              | 3               | 1 180                  | 1 490                    | 209             | 3 200             | 1 380             |
| 197            | 214   | 221            | 303            | –              | –              | 3              | 3               | 1 180                  | 1 490                    | 209             | 3 200             | 1 380             |
| 197            | –     | –              | 363            | 338            | 332            | 3              | 3               | 1 040                  | 1 320                    | 141             | 2 800             | 1 500             |
| 197            | 228   | 234            | 363            | –              | –              | 3              | 3               | 1 040                  | 1 320                    | 112             | 2 800             | 1 500             |
| 197            | 228   | 234            | 363            | –              | –              | 3              | 3               | 1 040                  | 1 320                    | 112             | 2 800             | 1 500             |
| 197            | 228   | 234            | 363            | –              | –              | 3              | 3               | 1 040                  | 1 320                    | 87              | 2 800             | 1 500             |
| 197            | 228   | 234            | 363            | –              | –              | 3              | 3               | 1 040                  | 1 320                    | 87              | 2 800             | 1 500             |
| 197            | –     | –              | 363            | 342            | 336            | 3              | 3               | 1 660                  | 2 320                    | 260             | 2 800             | 1 100             |
| 197            | –     | –              | 363            | 342            | 336            | 3              | 3               | 1 660                  | 2 320                    | 260             | 2 800             | 1 100             |
| 197            | 225   | 229            | 363            | –              | –              | 3              | 3               | 1 660                  | 2 320                    | 260             | 2 800             | 1 120             |
| 210            | 247   | 254            | 410            | –              | –              | 5              | 5               | 1 290                  | 1 630                    | 141             | 2 600             | 1 300             |
| 204            | 219   | 225            | 306            | –              | –              | 2,5            | 2,5             | 1 060                  | 1 660                    | 181             | 2 400             | –                 |
| 207            | –     | –              | 323            | 309            | 303            | 3              | 3               | 680                    | 930                      | 100             | 3 200             | 1 720             |
| 207            | –     | –              | 323            | 309            | 303            | 3              | 3               | 680                    | 930                      | 100             | 3 200             | 1 700             |
| 207            | 227   | 234            | 323            | –              | –              | 3              | 3               | 680                    | 930                      | 85              | 3 200             | 1 720             |
| 207            | 227   | 234            | 323            | –              | –              | 3              | 3               | 680                    | 930                      | 85              | 3 200             | 1 720             |
| 207            | 227   | 234            | 323            | –              | –              | 3              | 3               | 680                    | 930                      | 85              | 3 200             | 1 720             |
| 207            | 227   | 234            | 323            | –              | –              | 3              | 3               | 680                    | 930                      | 72              | 3 200             | 1 700             |
| 207            | 227   | 234            | 323            | –              | –              | 3              | 3               | 680                    | 930                      | 72              | 3 200             | 1 700             |
| 207            | 223   | 230            | 323            | –              | –              | 3              | 3               | 765                    | 1 020                    | 109             | 3 000             | 1 800             |
| 207            | 225   | 232            | 323            | –              | –              | 3              | 3               | 1 100                  | 1 660                    | 184             | 3 000             | 1 290             |
| 207            | 225   | 232            | 323            | –              | –              | 3              | 3               | 1 100                  | 1 660                    | 184             | 3 000             | 1 290             |
| 218            | 227   | 234            | 326            | –              | –              | 3              | 7               | 1 320                  | 2 040                    | 218             | 2 200             | –                 |
| 210            | –     | –              | 380            | 356            | 350            | 4              | 4               | 1 120                  | 1 430                    | 151             | 2 800             | 1 400             |
| 210            | 242   | 248            | 380            | –              | –              | 4              | 4               | 1 120                  | 1 430                    | 120             | 2 800             | 1 400             |
| 210            | 242   | 248            | 380            | –              | –              | 4              | 4               | 1 120                  | 1 430                    | 120             | 2 800             | 1 400             |
| 210            | –     | –              | 380            | 363            | 357            | 4              | 4               | 1 900                  | 2 650                    | 285             | 2 600             | 1 000             |
| 210            | –     | –              | 380            | 363            | 357            | 4              | 4               | 1 900                  | 2 650                    | 285             | 2 600             | 1 000             |
| 210            | 237,8 | 242,2          | 380            | –              | –              | 4              | 4               | 1 900                  | 2 650                    | 285             | 2 600             | 1 010             |
| 220            | 262   | 269            | 430            | –              | –              | 5              | 5               | 1 340                  | 1 760                    | 152             | 2 600             | 1 200             |

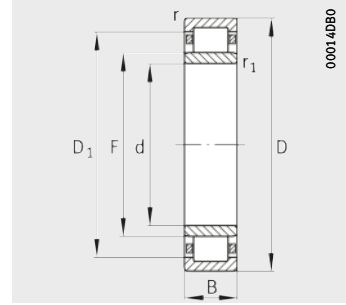


# Cylindrical roller bearings with cage

Single row  
Non-locating bearings



Design 1  
N



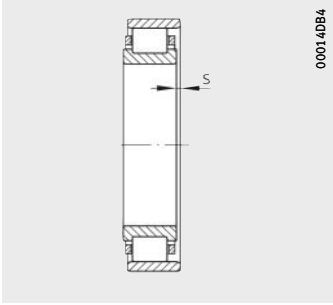
Design 3  
NU

**Dimension table** (continued) · Dimensions in mm

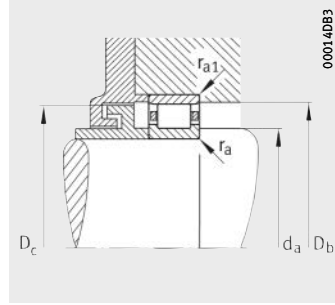
| Designation    | Design          | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |     |     |                |                |
|----------------|-----------------|------------------|------------|-----|-----|------|----------------|-----------------|-----|-----|----------------|----------------|
|                |                 |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>2)</sup> | E   | F   | D <sub>1</sub> | d <sub>1</sub> |
|                |                 |                  |            |     |     | min. | min.           |                 |     |     | ≈              | ≈              |
| NU3140-M1      | 3               | 42,4             | 200        | 340 | 112 | 3    | 3              | 10              | 313 | 233 | 300,2          | –              |
| N240-E-M1      | 1               | 27,2             | 200        | 360 | 58  | 4    | 4              | 4,8             | 323 | –   | –              | 257,6          |
| NU240-E-M1     | 3               | 27,2             | 200        | 360 | 58  | 4    | 4              | 4,8             | 323 | 243 | 311,5          | –              |
| NU240-E-M1-C3  | 3               | 27,2             | 200        | 360 | 58  | 4    | 4              | 4,8             | 323 | 243 | 311,5          | –              |
| NU240-E-M1A    | 3               | 27,2             | 200        | 360 | 58  | 4    | 4              | 4,8             | 323 | 243 | 311,5          | –              |
| NU1240-M1      | 3               | 32,3             | 200        | 360 | 70  | 4    | 4              | 5               | 328 | 238 | 313,1          | –              |
| N2240-E-M1     | 1               | 44,7             | 200        | 360 | 98  | 4    | 4              | 8,2             | 325 | –   | –              | 256,3          |
| N2240-E-MP1B   | 1               | 43,9             | 200        | 360 | 98  | 4    | 4              | 8,2             | 325 | –   | –              | 256,3          |
| N2240-E-N-M1   | 1 <sup>1)</sup> | 44,7             | 200        | 360 | 98  | 4    | 4              | 8,2             | 325 | –   | –              | 256,3          |
| N2240-E-N-MP1B | 1 <sup>1)</sup> | 43,9             | 200        | 360 | 98  | 4    | 4              | 8,2             | 325 | –   | –              | 256,3          |
| NU2240-E-M1    | 3               | 44,7             | 200        | 360 | 98  | 4    | 4              | 8,2             | 325 | 241 | 312,9          | –              |
| NU2240-E-M1A   | 3               | 45,7             | 200        | 360 | 98  | 4    | 4              | 8,2             | 325 | 241 | 312,9          | –              |
| NU2240-E-MPA   | 3               | 44,4             | 200        | 360 | 98  | 4    | 4              | 8,2             | 325 | 241 | 312,9          | –              |
| N340-E-M1      | 1               | 57               | 200        | 420 | 80  | 5    | 5              | 6,3             | 370 | –   | –              | 279            |
| NU340-E-M1     | 3               | 57,3             | 200        | 420 | 80  | 5    | 5              | 6,3             | 370 | 258 | 351,8          | –              |
| NU340-E-M1A    | 3               | 57,3             | 200        | 420 | 80  | 5    | 5              | 6,3             | 370 | 258 | 351,8          | –              |
| NU340-E-MP1A   | 3               | 57               | 200        | 420 | 80  | 5    | 5              | 6,3             | 370 | 258 | 351,8          | –              |
| NU2340-EX-M1   | 3               | 95,6             | 200        | 420 | 138 | 5    | 5              | 11,3            | 377 | 253 | 356,9          | –              |
| NU440-M1       | 3               | 103              | 200        | 480 | 102 | 6    | 6              | 9,4             | 404 | 276 | 378,9          | –              |

<sup>1)</sup> With retaining slot in outer ring.

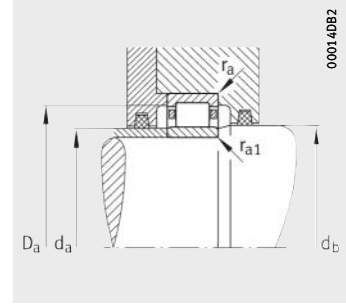




2) Axial displacement "s"  
for N and NU



Mounting dimensions  
for N



Mounting dimensions  
for NU

Mounting dimensions

Basic load ratings

Fatigue  
limit load

Limiting  
speed

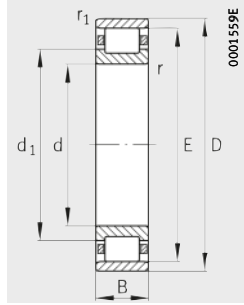
Reference  
speed

| d <sub>a</sub> |       | d <sub>b</sub> | D <sub>a</sub> | D <sub>b</sub> | D <sub>c</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub> | n <sub>G</sub>    | n <sub>B</sub>    |
|----------------|-------|----------------|----------------|----------------|----------------|----------------|-----------------|------------------------|--------------------------|-----------------|-------------------|-------------------|
| min.           | max.  | min.           | max.           | min.           | max.           | max.           | max.            | kN                     | kN                       | kN              | min <sup>-1</sup> | min <sup>-1</sup> |
| 214            | 230   | 236            | 326            | –              | –              | 2,5            | 2,5             | 1 290                  | 2 080                    | 230             | 2 800             | 1 500             |
| 217            | –     | –              | 343            | 326            | 320            | 3              | 3               | 750                    | 1 040                    | 110             | 3 000             | 1 600             |
| 217            | 240   | 247            | 343            | –              | –              | 3              | 3               | 750                    | 1 040                    | 94              | 3 000             | 1 600             |
| 217            | 240   | 247            | 343            | –              | –              | 3              | 3               | 750                    | 1 040                    | 94              | 3 000             | 1 600             |
| 217            | 240   | 247            | 343            | –              | –              | 3              | 3               | 750                    | 1 040                    | 94              | 3 000             | 1 600             |
| 217            | 235   | 241            | 343            | –              | –              | 3              | 3               | 880                    | 1 160                    | 122             | 2 800             | 1 700             |
| 217            | –     | –              | 343            | 328            | 322            | 3              | 3               | 1 220                  | 1 860                    | 205             | 2 800             | 1 200             |
| 217            | –     | –              | 343            | 328            | 322            | 3              | 3               | 1 220                  | 1 860                    | 205             | 2 800             | 1 200             |
| 217            | –     | –              | 343            | 328            | 322            | 3              | 3               | 1 220                  | 1 860                    | 205             | 2 800             | 1 200             |
| 217            | –     | –              | 343            | 328            | 322            | 3              | 3               | 1 220                  | 1 860                    | 205             | 2 800             | 1 200             |
| 217            | 240   | 247            | 343            | –              | –              | 3              | 3               | 1 220                  | 1 860                    | 206             | 2 800             | 1 180             |
| 217            | 240   | 247            | 343            | –              | –              | 3              | 3               | 1 220                  | 1 860                    | 206             | 2 800             | 1 180             |
| 217            | 240   | 247            | 343            | –              | –              | 3              | 3               | 1 220                  | 1 860                    | 206             | 2 800             | 1 200             |
| 220            | –     | –              | 400            | 373            | 367            | 4              | 4               | 1 180                  | 1 530                    | 161             | 2 600             | 1 320             |
| 220            | 255   | 261            | 400            | –              | –              | 4              | 4               | 1 180                  | 1 530                    | 128             | 2 600             | 1 320             |
| 220            | 255   | 261            | 400            | –              | –              | 4              | 4               | 1 180                  | 1 530                    | 128             | 2 600             | 1 320             |
| 220            | 255   | 261            | 400            | –              | –              | 4              | 4               | 1 180                  | 1 530                    | 99              | 2 600             | 1 300             |
| 220            | 250,7 | 255,3          | 400            | –              | –              | 4              | 4               | 2 040                  | 2 900                    | 310             | 2 400             | 940               |
| 230            | 273   | 280            | 450            | –              | –              | 5              | 5               | 1 460                  | 1 860                    | 159             | 2 400             | 1 200             |

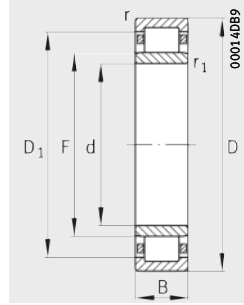


# Cylindrical roller bearings with cage

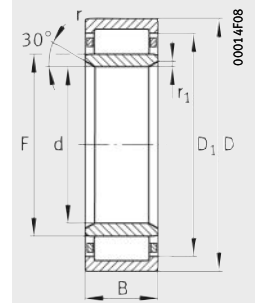
Single row  
Non-locating  
bearings



Design 1  
N



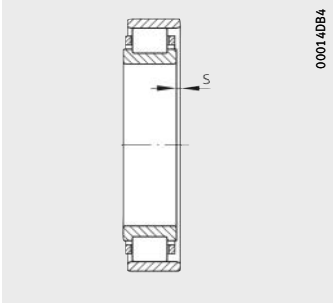
Design 3  
NU, cylindrical or  
tapered bore



Design 4  
NU

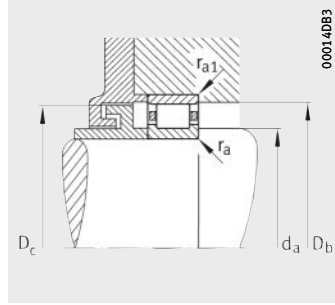
**Dimension table** (continued) · Dimensions in mm

| Designation           | Design | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |       |       |                |                |
|-----------------------|--------|------------------|------------|-----|-----|------|----------------|-----------------|-------|-------|----------------|----------------|
|                       |        |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E     | F     | D <sub>1</sub> | d <sub>1</sub> |
|                       |        |                  |            |     |     | min. | min.           |                 |       |       | ≈              | ≈              |
| <b>N1044-M1</b>       | 1      | 20,4             | <b>220</b> | 340 | 56  | 3    | 3              | 6,2             | 310   | –     | –              | 261,7          |
| <b>N1044-M1B</b>      | 1      | 18,8             | <b>220</b> | 340 | 56  | 3    | 3              | 6,2             | 310   | –     | –              | 261,7          |
| <b>NU1044-K-M1</b>    | 3      | 18,3             | <b>220</b> | 340 | 56  | 3    | –              | 6,2             | 310   | 250   | 298,9          | –              |
| <b>NU1044-K-M1A</b>   | 3      | 18,7             | <b>220</b> | 340 | 56  | 3    | –              | 6,2             | 310   | 250   | 298,9          | –              |
| <b>NU1044-M1</b>      | 3      | 20,5             | <b>220</b> | 340 | 56  | 3    | 3              | 6,2             | 310   | 250   | 298,9          | –              |
| <b>NU1044-M1-C3</b>   | 3      | 20,5             | <b>220</b> | 340 | 56  | 3    | 3              | 6,2             | 310   | 250   | 298,9          | –              |
| <b>NU1044-M1A</b>     | 3      | 19               | <b>220</b> | 340 | 56  | 3    | 3              | 6,2             | 310   | 250   | 298,9          | –              |
| <b>NU1044-MP1A</b>    | 3      | 18,2             | <b>220</b> | 340 | 56  | 3    | 3              | 6,2             | 310   | 250   | 298,9          | –              |
| <b>NU2044-E-M1</b>    | 3      | 25,1             | <b>220</b> | 340 | 72  | 3    | 3              | 4               | 314   | 250   | 302,8          | –              |
| <b>NU3044-M1</b>      | 3      | 30,9             | <b>220</b> | 340 | 90  | 3    | 3              | 2,5             | 310   | 250   | 298,9          | –              |
| <b>Z-546293.ZL</b>    | 3      | 37,2             | <b>220</b> | 350 | 98  | 3    | 3              | 6,7             | 323   | 247   | 310,4          | –              |
| <b>NU3144-M1</b>      | 3      | 52,6             | <b>220</b> | 370 | 120 | 4    | 4              | 10,2            | 340   | 256   | 326,1          | –              |
| <b>N244-E-M1</b>      | 1      | 38,2             | <b>220</b> | 400 | 65  | 4    | 4              | 5,5             | 358   | –     | –              | 285,2          |
| <b>NU244-E-M1</b>     | 3      | 38,1             | <b>220</b> | 400 | 65  | 4    | 4              | 5,5             | 358   | 268   | 344,9          | –              |
| <b>NU244-E-M1A</b>    | 3      | 38,1             | <b>220</b> | 400 | 65  | 4    | 4              | 5,5             | 358   | 268   | 344,9          | –              |
| <b>NU244-E-MP1A</b>   | 3      | 38,3             | <b>220</b> | 400 | 65  | 4    | 4              | 5,5             | 358   | 268   | 344,9          | –              |
| <b>NU1244-M1</b>      | 3      | 45,2             | <b>220</b> | 400 | 78  | 4    | 4              | 5,7             | 365   | 261   | 348            | –              |
| <b>NU2244-EX-M1</b>   | 3      | 61,6             | <b>220</b> | 400 | 108 | 4    | 4              | 8,4             | 367   | 259   | 349,4          | –              |
| <b>NU2244-EX-M1A</b>  | 3      | 62,8             | <b>220</b> | 400 | 108 | 4    | 4              | 8,4             | 367   | 259   | 349,4          | –              |
| <b>NU2244-EX-MP1A</b> | 3      | 60,4             | <b>220</b> | 400 | 108 | 4    | 4              | 8,4             | 367   | 259   | 349,4          | –              |
| <b>Z-548409.ZL</b>    | 4      | 75,1             | <b>220</b> | 400 | 133 | 3    | 9,5            | –               | 366,1 | 266,1 | 349,6          | –              |
| <b>N344-E-M1</b>      | 1      | 75,5             | <b>220</b> | 460 | 88  | 5    | 5              | 7               | 406   | –     | –              | 305,1          |
| <b>NU344-E-M1</b>     | 3      | 75,5             | <b>220</b> | 460 | 88  | 5    | 5              | 7               | 406   | 282   | 386            | –              |
| <b>NU344-E-M1A</b>    | 3      | 75,5             | <b>220</b> | 460 | 88  | 5    | 5              | 7               | 406   | 282   | 386            | –              |
| <b>NU2344-EX-M1</b>   | 3      | 121              | <b>220</b> | 460 | 145 | 5    | 5              | 11,9            | 413   | 277   | 391,2          | –              |
| <b>NU444-M1</b>       | 3      | 150              | <b>220</b> | 540 | 115 | 6    | 6              | 10              | 455   | 305   | 426,1          | –              |



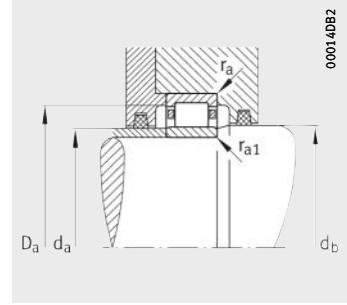
00014DB4

1) Axial displacement "s"  
for N and NU



00014DB3

Mounting dimensions  
for N



00014DB2

Mounting dimensions  
for NU

Mounting dimensions

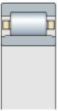
Basic load ratings

Fatigue  
limit load

Limiting  
speed

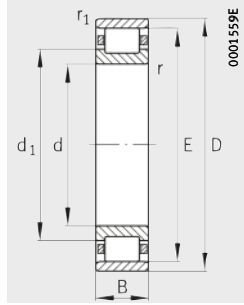
Reference  
speed

| d <sub>a</sub> |       | d <sub>b</sub> | D <sub>a</sub> | D <sub>b</sub> | D <sub>c</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub> | n <sub>G</sub> | n <sub>B</sub> |
|----------------|-------|----------------|----------------|----------------|----------------|----------------|-----------------|------------------------|--------------------------|-----------------|----------------|----------------|
| min.           | max.  |                |                |                |                |                |                 |                        |                          |                 |                |                |
| 232            | –     | –              | 328            | 313            | 307            | 2,5            | 2,5             | 510                    | 765                      | 80              | 3 200          | 2 000          |
| 232            | –     | –              | 328            | 313            | 307            | 2,5            | 2,5             | 510                    | 765                      | 80              | 3 200          | 2 000          |
| 232            | 248   | 254            | 328            | –              | –              | 2,5            | –               | 510                    | 765                      | 69              | 3 200          | 2 040          |
| 232            | 248   | 254            | 328            | –              | –              | 2,5            | –               | 510                    | 765                      | 69              | 3 200          | 2 000          |
| 232            | 248   | 254            | 328            | –              | –              | 2,5            | 2,5             | 510                    | 765                      | 69              | 3 200          | 2 040          |
| 232            | 248   | 254            | 328            | –              | –              | 2,5            | 2,5             | 510                    | 765                      | 69              | 3 200          | 2 040          |
| 232            | 248   | 254            | 328            | –              | –              | 2,5            | 2,5             | 510                    | 765                      | 69              | 3 200          | 2 040          |
| 232            | 248   | 254            | 328            | –              | –              | 2,5            | 2,5             | 510                    | 765                      | 60              | 3 200          | 2 040          |
| 232            | 247   | 253            | 328            | –              | –              | 2,5            | 2,5             | 880                    | 1 460                    | 161             | 3 000          | 1 500          |
| 232            | 246   | 254            | 328            | –              | –              | 2,5            | 2,5             | 965                    | 1 730                    | 191             | 3 000          | 1 400          |
| 232            | 243   | 251            | 338            | –              | –              | 2,5            | 2,5             | 1 250                  | 2 080                    | 231             | 2 800          | –              |
| 237            | 253   | 259            | 353            | –              | –              | 3              | 3               | 1 460                  | 2 400                    | 265             | 2 800          | 1 300          |
| 237            | –     | –              | 383            | 361            | 355            | 3              | 3               | 950                    | 1 320                    | 135             | 2 800          | 1 400          |
| 237            | 265   | 271            | 383            | –              | –              | 3              | 3               | 950                    | 1 320                    | 109             | 2 800          | 1 380          |
| 237            | 265   | 271            | 383            | –              | –              | 3              | 3               | 950                    | 1 320                    | 109             | 2 800          | 1 380          |
| 237            | 265   | 271            | 383            | –              | –              | 3              | 3               | 950                    | 1 320                    | 87              | 2 800          | 1 400          |
| 237            | 257   | 264            | 383            | –              | –              | 3              | 3               | 1 080                  | 1 430                    | 150             | 2 800          | 1 500          |
| 237            | 256,7 | 261,3          | 383            | –              | –              | 3              | 3               | 1 630                  | 2 360                    | 250             | 2 600          | 1 000          |
| 237            | 256,7 | 261,3          | 383            | –              | –              | 3              | 3               | 1 630                  | 2 360                    | 250             | 2 600          | 1 000          |
| 237            | 256,7 | 261,3          | 383            | –              | –              | 3              | 3               | 1 630                  | 2 360                    | 250             | 2 600          | 1 000          |
| 260            | 263   | 269            | 386            | –              | –              | 2,5            | 8               | 1 900                  | 3 000                    | 320             | 2 600          | 1 100          |
| 240            | –     | –              | 440            | 409            | 403            | 4              | 4               | 1 430                  | 1 900                    | 192             | 2 400          | 1 100          |
| 240            | 279   | 285            | 440            | –              | –              | 4              | 4               | 1 430                  | 1 900                    | 152             | 2 400          | 1 140          |
| 240            | 279   | 285            | 440            | –              | –              | 4              | 4               | 1 430                  | 1 900                    | 152             | 2 400          | 1 140          |
| 240            | 274,7 | 279,3          | 440            | –              | –              | 4              | 4               | 2 360                  | 3 350                    | 340             | 2 200          | 830            |
| 250            | 302   | 309            | 510            | –              | –              | 5              | 5               | 1 960                  | 2 550                    | 209             | 2 200          | 950            |

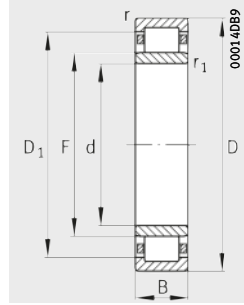


# Cylindrical roller bearings with cage

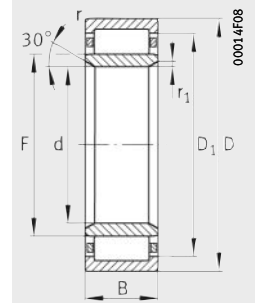
Single row  
Non-locating  
bearings



Design 1  
N



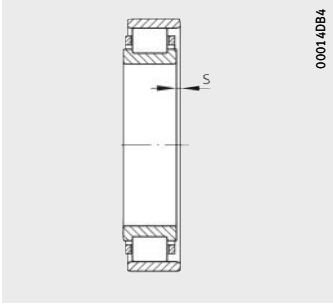
Design 3  
NU, cylindrical or  
tapered bore



Design 4  
NU

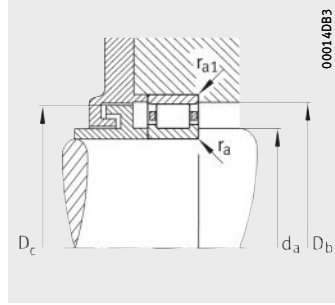
**Dimension table** (continued) · Dimensions in mm

| Designation   | Design | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |       |       |                |                |
|---------------|--------|------------------|------------|-----|-----|------|----------------|-----------------|-------|-------|----------------|----------------|
|               |        |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E     | F     | D <sub>1</sub> | d <sub>1</sub> |
|               |        |                  |            |     |     | min. | min.           |                 |       |       | ≈              | ≈              |
| NU1948-M1     | 3      | 8,37             | 240        | 320 | 38  | 2,1  | 1,5            | 4,6             | 299   | 261   | 292,6          | –              |
| NU3948-E-M1   | 3      | 13,6             | 240        | 320 | 60  | 2,1  | 1,5            | 3,2             | 302   | 260   | 295            | –              |
| NU3948-E-MP1A | 3      | 13,5             | 240        | 320 | 60  | 2,1  | 1,5            | 5,3             | 302   | 260   | 295            | –              |
| N1048-M1      | 1      | 19,8             | 240        | 360 | 56  | 3    | 3              | 6,4             | 330   | –     | –              | 281,6          |
| N1048-M1B     | 1      | 20               | 240        | 360 | 56  | 3    | 3              | 6,4             | 330   | –     | –              | 281,6          |
| NU1048-K-M1   | 3      | 20               | 240        | 360 | 56  | 3    | –              | 6,4             | 330   | 270   | 318,9          | –              |
| NU1048-M1     | 3      | 19,9             | 240        | 360 | 56  | 3    | 3              | 6,4             | 330   | 270   | 318,9          | –              |
| NU1048-M1-C3  | 3      | 19,9             | 240        | 360 | 56  | 3    | 3              | 6,4             | 330   | 270   | 318,9          | –              |
| NU1048-M1A    | 3      | 20,2             | 240        | 360 | 56  | 3    | 3              | 6,4             | 330   | 270   | 318,9          | –              |
| NU1048-MP1A   | 3      | 19,2             | 240        | 360 | 56  | 3    | 3              | 6,4             | 330   | 270   | 318,9          | –              |
| NU2048-E-M1   | 3      | 26,6             | 240        | 360 | 72  | 3    | 3              | 1,9             | 334   | 270   | 322,8          | –              |
| NU3048-M1     | 3      | 33,6             | 240        | 360 | 92  | 3    | 3              | 9,8             | 330   | 270   | 318,9          | –              |
| NU3148-M1     | 3      | 64,8             | 240        | 400 | 128 | 4    | 4              | 12              | 368   | 278   | 353,2          | –              |
| N248-E-M1     | 1      | 51,5             | 240        | 440 | 72  | 4    | 4              | 6               | 393   | –     | –              | 312            |
| NU248-E-M1    | 3      | 51,8             | 240        | 440 | 72  | 4    | 4              | 6               | 393   | 293   | 376,6          | –              |
| NU248-E-M1A   | 3      | 51,8             | 240        | 440 | 72  | 4    | 4              | 6               | 393   | 293   | 376,6          | –              |
| NU1248-M1     | 3      | 60,4             | 240        | 440 | 85  | 4    | 4              | 6,5             | 399   | 287   | 380,8          | –              |
| NU2248-EX-M1  | 3      | 82,8             | 240        | 440 | 120 | 4    | 4              | 10,2            | 399   | 287   | 380,7          | –              |
| NU2248-EX-M1A | 3      | 84,3             | 240        | 440 | 120 | 4    | 4              | 10,2            | 399   | 287   | 380,7          | –              |
| NU2248-EX-MPA | 3      | 83,3             | 240        | 440 | 120 | 4    | 4              | 10,2            | 399   | 287   | 380,7          | –              |
| Z-548410.ZL   | 4      | 102              | 240        | 440 | 146 | 3    | 9,5            | –               | 401,4 | 291,4 | 383,4          | –              |
| NU348-E-M1    | 3      | 95,7             | 240        | 500 | 95  | 5    | 5              | 7,4             | 442   | 306   | 421,2          | –              |
| NU2348-EX-M1  | 3      | 151              | 240        | 500 | 155 | 5    | 5              | 13,3            | 447   | 303   | 424            | –              |
| NU448-M1      | 3      | 176              | 240        | 580 | 122 | 6    | 6              | 10,9            | 490   | 330   | 459,1          | –              |
| Z-544518.ZL   | 3      | 54,1             | 241        | 375 | 127 | 10   | 4              | –               | 342,5 | 282,5 | 332,6          | –              |
| Z-549124.ZL   | 3      | 59,7             | 250        | 410 | 111 | 4    | 4              | –               | 378   | 282   | 362,3          | –              |



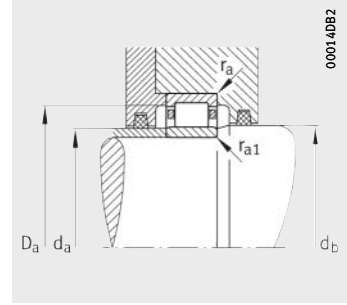
000140B4

1) Axial displacement "s"  
for N and NU



000140B3

Mounting dimensions  
for N



000140B2

Mounting dimensions  
for NU

Mounting dimensions

Basic load ratings

Fatigue  
limit load

Limiting  
speed

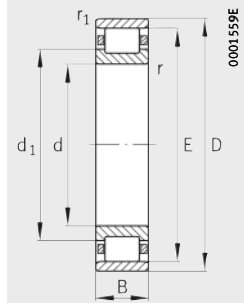
Reference  
speed

| d <sub>a</sub> |       | d <sub>b</sub> | D <sub>a</sub> | D <sub>b</sub> | D <sub>c</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | C <sub>ur</sub><br>kN | n <sub>G</sub><br>min <sup>-1</sup> | n <sub>B</sub><br>min <sup>-1</sup> |
|----------------|-------|----------------|----------------|----------------|----------------|----------------|-----------------|------------------------------|--------------------------------|-----------------------|-------------------------------------|-------------------------------------|
| min.           | max.  |                |                |                |                |                |                 |                              |                                |                       |                                     |                                     |
| 248            | 258   | 264            | 309            | –              | –              | 2              | 1,5             | 330                          | 490                            | 44                    | 3 800                               | –                                   |
| 248            | 257   | 263            | 309            | –              | –              | 2              | 1,5             | 700                          | 1 200                          | 130                   | 3 200                               | 1 400                               |
| 248            | 257   | 263            | 309            | –              | –              | 2              | 1,5             | 700                          | 1 200                          | 130                   | 3 200                               | 1 400                               |
| 252            | –     | –              | 348            | 333            | 327            | 2,5            | 2,5             | 540                          | 850                            | 86                    | 3 000                               | 1 800                               |
| 252            | –     | –              | 348            | 333            | 327            | 2,5            | 2,5             | 540                          | 850                            | 86                    | 3 000                               | 1 800                               |
| 252            | 268   | 275            | 348            | –              | –              | 2,5            | –               | 540                          | 850                            | 64                    | 3 000                               | 1 800                               |
| 252            | 268   | 275            | 348            | –              | –              | 2,5            | 2,5             | 540                          | 850                            | 74                    | 3 000                               | 1 850                               |
| 252            | 268   | 275            | 348            | –              | –              | 2,5            | 2,5             | 540                          | 850                            | 74                    | 3 000                               | 1 850                               |
| 252            | 268   | 275            | 348            | –              | –              | 2,5            | 2,5             | 540                          | 850                            | 74                    | 3 000                               | 1 850                               |
| 252            | 268   | 275            | 348            | –              | –              | 2,5            | 2,5             | 540                          | 850                            | 64                    | 3 000                               | 1 850                               |
| 252            | 269   | 275            | 348            | –              | –              | 2,5            | 2,5             | 915                          | 1 600                          | 172                   | 2 800                               | 1 400                               |
| 252            | 266   | 274            | 348            | –              | –              | 2,5            | 2,5             | 1 000                        | 1 900                          | 205                   | 2 800                               | 1 300                               |
| 257            | 275   | 281            | 383            | –              | –              | 3              | 3               | 1 660                        | 2 800                          | 295                   | 2 600                               | 1 100                               |
| 257            | –     | –              | 423            | 396            | 390            | 3              | 3               | 1 140                        | 1 600                          | 163                   | 2 600                               | 1 220                               |
| 257            | 290   | 296            | 423            | –              | –              | 3              | 3               | 1 140                        | 1 600                          | 132                   | 2 600                               | 1 220                               |
| 257            | 290   | 296            | 423            | –              | –              | 3              | 3               | 1 140                        | 1 600                          | 132                   | 2 600                               | 1 220                               |
| 257            | 284,5 | 289,5          | 423            | –              | –              | 3              | 3               | 1 290                        | 1 760                          | 183                   | 2 400                               | 1 300                               |
| 257            | 284,5 | 289,5          | 423            | –              | –              | 3              | 3               | 1 830                        | 2 800                          | 295                   | 2 400                               | 900                                 |
| 257            | 284,5 | 289,5          | 423            | –              | –              | 3              | 3               | 1 830                        | 2 800                          | 295                   | 2 400                               | 900                                 |
| 257            | 284,5 | 289,5          | 423            | –              | –              | 3              | 3               | 1 830                        | 2 800                          | 295                   | 2 400                               | 900                                 |
| 280            | 288   | 294            | 426            | –              | –              | 2,5            | 8               | 2 240                        | 3 600                          | 380                   | 2 400                               | 1 000                               |
| 260            | 303   | 309            | 480            | –              | –              | 4              | 4               | 1 730                        | 2 280                          | 176                   | 2 200                               | 1 000                               |
| 260            | 300,5 | 305,5          | 480            | –              | –              | 4              | 4               | 2 600                        | 3 750                          | 375                   | 2 000                               | 750                                 |
| 270            | 327   | 334            | 550            | –              | –              | 5              | 5               | 2 240                        | 2 900                          | 198                   | 1 900                               | 850                                 |
| 258            | 279   | 285            | 340            | –              | –              | 8              | 3               | 1 400                        | 2 900                          | 215                   | 1 800                               | –                                   |
| 267            | 279   | 285            | 393            | –              | –              | 3              | 3               | 1 630                        | 2 600                          | 270                   | 2 600                               | 1 100                               |

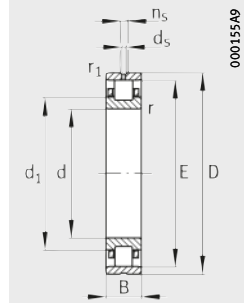


# Cylindrical roller bearings with cage

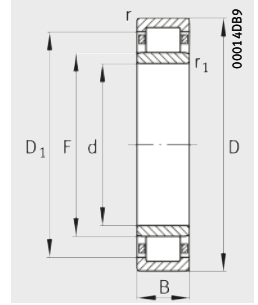
Single row  
Non-locating  
bearings



Design 1  
N



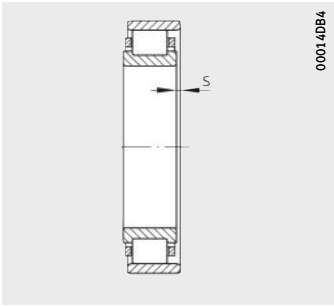
Design 2  
N with lubrication  
groove and holes



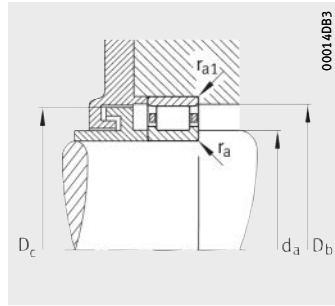
Design 3  
NU, cylindrical or  
tapered bore

Dimension table (continued) · Dimensions in mm

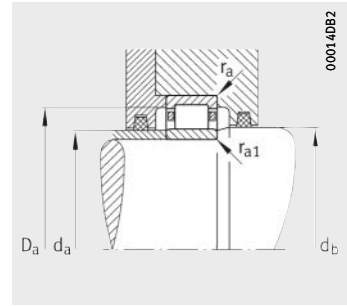
| Designation   | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |     |     |                |                |                |                |
|---------------|-------------|------------------|------------|-----|-----|------|----------------|-----------------|-----|-----|----------------|----------------|----------------|----------------|
|               |             |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E   | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|               |             |                  |            |     |     | min. | min.           |                 |     |     | ≈              | ≈              |                |                |
| Z-541924.ZL   | 2           | 4,62             | 260        | 320 | 28  | 2    | 1,1            | 5               | 306 | –   | –              | 284            | 2              | 6,5            |
| NU1852-M1     | 3           | 4,83             | 260        | 320 | 28  | 2    | 1,1            | 3,2             | 307 | 275 | 300,6          | –              | –              | –              |
| NU3852-M1     | 3           | 7,9              | 260        | 320 | 45  | 2    | 1,1            | 4,6             | 307 | 275 | 300,6          | –              | –              | –              |
| NU1952-M1     | 3           | 14,2             | 260        | 360 | 46  | 2,1  | 1,5            | 5,3             | 334 | 286 | 324,4          | –              | –              | –              |
| NU3952-E-M1   | 3           | 23,1             | 260        | 360 | 75  | 2,1  | 1,5            | 4,3             | 338 | 286 | 329,3          | –              | –              | –              |
| N1052-M1      | 1           | 29,4             | 260        | 400 | 65  | 4    | 4              | 7,2             | 364 | –   | –              | 309,1          | –              | –              |
| N1052-M1B     | 1           | 29,9             | 260        | 400 | 65  | 4    | 4              | 7,2             | 364 | –   | –              | 309,1          | –              | –              |
| NU1052-K-M1   | 3           | 29,2             | 260        | 400 | 65  | 4    | –              | 7,2             | 364 | 296 | 351,3          | –              | –              | –              |
| NU1052-M1     | 3           | 29,7             | 260        | 400 | 65  | 4    | 4              | 7,2             | 364 | 296 | 351,3          | –              | –              | –              |
| NU1052-M1-C3  | 3           | 29,7             | 260        | 400 | 65  | 4    | 4              | 7,2             | 364 | 296 | 351,3          | –              | –              | –              |
| NU1052-M1A    | 3           | 29,9             | 260        | 400 | 65  | 4    | 4              | 7,2             | 364 | 296 | 351,3          | –              | –              | –              |
| NU1052-MP1A   | 3           | 29               | 260        | 400 | 65  | 4    | 4              | 7,2             | 364 | 296 | 351,3          | –              | –              | –              |
| NU2052-E-M1   | 3           | 39,5             | 260        | 400 | 82  | 4    | 4              | 6,2             | 370 | 294 | 356,3          | –              | –              | –              |
| NU3052-M1     | 3           | 49,3             | 260        | 400 | 104 | 4    | 4              | 9,7             | 364 | 296 | 351,3          | –              | –              | –              |
| NU3152-M1     | 3           | 89,7             | 260        | 440 | 144 | 4    | 4              | 13,5            | 404 | 304 | 388,2          | –              | –              | –              |
| NU252-E-M1    | 3           | 68,4             | 260        | 480 | 80  | 5    | 5              | 6,2             | 429 | 317 | 410,8          | –              | –              | –              |
| NU252-E-M1A   | 3           | 68,4             | 260        | 480 | 80  | 5    | 5              | 6,2             | 429 | 317 | 410,8          | –              | –              | –              |
| NU1252-M1     | 3           | 77               | 260        | 480 | 90  | 5    | 5              | 6,7             | 433 | 313 | 413,6          | –              | –              | –              |
| NU2252-E-M1   | 3           | 109              | 260        | 480 | 130 | 5    | 5              | 10,5            | 433 | 313 | 413,6          | –              | –              | –              |
| NU2252-E-M1A  | 3           | 111              | 260        | 480 | 130 | 5    | 5              | 10,5            | 433 | 313 | 413,6          | –              | –              | –              |
| NU2252-E-MP1A | 3           | 108              | 260        | 480 | 130 | 5    | 5              | 10,5            | 433 | 313 | 413,6          | –              | –              | –              |
| NU352-E-M1    | 3           | 121              | 260        | 540 | 102 | 6    | 6              | 10              | 477 | 337 | 454,6          | –              | –              | –              |
| NU2352-EX-M1  | 3           | 189              | 260        | 540 | 165 | 6    | 6              | 13,7            | 484 | 324 | 458,4          | –              | –              | –              |
| Z-547407.ZL   | 1           | 12,8             | 279        | 368 | 44  | 4    | 4              | 4               | 348 | –   | –              | 306,1          | –              | –              |
| NU1856-M1     | 3           | 7,1              | 280        | 350 | 33  | 2    | 1,1            | 4               | 333 | 299 | 327,1          | –              | –              | –              |
| NU1956-M1     | 3           | 15               | 280        | 380 | 46  | 2,1  | 1,5            | 5,2             | 354 | 306 | 345,4          | –              | –              | –              |
| NU3956-E-M1   | 3           | 24,8             | 280        | 380 | 75  | 2,1  | 1,5            | 6,6             | 358 | 306 | 349,3          | –              | –              | –              |
| N1056-M1      | 1           | 31,3             | 280        | 420 | 65  | 4    | 4              | 7,2             | 384 | –   | –              | 329,1          | –              | –              |
| N1056-M1B     | 1           | 31,3             | 280        | 420 | 65  | 4    | 4              | 7,2             | 384 | –   | –              | 329,1          | –              | –              |
| NU1056-M1     | 3           | 31,4             | 280        | 420 | 65  | 4    | 4              | 7,2             | 384 | 316 | 371,3          | –              | –              | –              |
| NU1056-M1-C3  | 3           | 31,4             | 280        | 420 | 65  | 4    | 4              | 7,2             | 384 | 316 | 371,3          | –              | –              | –              |
| NU1056-M1A    | 3           | 31,7             | 280        | 420 | 65  | 4    | 4              | 7,2             | 384 | 316 | 371,3          | –              | –              | –              |
| NU1056-MP1A   | 3           | 30,9             | 280        | 420 | 65  | 4    | 4              | 7,2             | 384 | 316 | 371,3          | –              | –              | –              |



1) Axial displacement "s"  
for N and NU

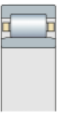


Mounting dimensions  
for N



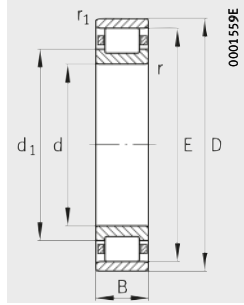
Mounting dimensions  
for NU

| Mounting dimensions |       |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|---|---|--|
| $d_a$               |       | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |   |   |  |
| min.                | max.  |       |       |       |       |       |          |                     |                         |   |   |  |
| 269                 | –     | –     | 311   | 310   | 302   | 2     | 1,1      | 106                 | 176                     | 13,5                                    | 3 800   | –  |
| 269                 | 272   | 278   | 311   | –     | –     | 2     | 1        | 270                 | 440                     | 39                                      | 3 600   | –  |
| 269                 | 272   | 278   | 311   | –     | –     | 2     | 1        | 485                 | 930                     | 100                                     | 3 200   | 1 300  |
| 268                 | 283   | 289   | 349   | –     | –     | 2     | 1,5      | 425                 | 735                     | 64                                      | 3 000   | –  |
| 268                 | 283   | 289   | 349   | –     | –     | 2     | 1,5      | 830                 | 1 660                   | 179                                     | 2 800   | 1 200  |
| 275                 | –     | –     | 385   | 366,5 | 361,5 | 3     | 3        | 655                 | 1 020                   | 104                                     | 2 800   | 1 700  |
| 275                 | –     | –     | 385   | 366,5 | 361,5 | 3     | 3        | 655                 | 1 020                   | 104                                     | 2 800   | 1 700  |
| 275                 | 292   | 300   | 385   | –     | –     | 3     | –        | 655                 | 1 020                   | 90                                      | 2 800   | 1 690  |
| 275                 | 292   | 300   | 385   | –     | –     | 3     | 3        | 655                 | 1 020                   | 90                                      | 2 800   | 1 690  |
| 275                 | 292   | 300   | 385   | –     | –     | 3     | 3        | 655                 | 1 020                   | 90                                      | 2 800   | 1 690  |
| 275                 | 292   | 300   | 385   | –     | –     | 3     | 3        | 655                 | 1 020                   | 90                                      | 2 800   | 1 690  |
| 275                 | 292   | 300   | 385   | –     | –     | 3     | 3        | 655                 | 1 020                   | 90                                      | 2 800   | 1 690  |
| 275                 | 291   | 297   | 385   | –     | –     | 3     | 3        | 1 200               | 2 080                   | 217                                     | 2 600   | 1 200  |
| 275                 | 292   | 300   | 385   | –     | –     | 3     | 3        | 1 270               | 2 400                   | 255                                     | 2 800   | 1 100  |
| 277                 | 301   | 307   | 423   | –     | –     | 3     | 3        | 2 040               | 3 400                   | 355                                     | 2 400   | 1 000  |
| 280                 | 314   | 320   | 460   | –     | –     | 4     | 4        | 1 340               | 1 900                   | 154                                     | 2 400   | 1 110  |
| 280                 | 314   | 320   | 460   | –     | –     | 4     | 4        | 1 340               | 1 900                   | 154                                     | 2 400   | 1 110  |
| 280                 | 310   | 316   | 460   | –     | –     | 4     | 4        | 1 460               | 2 040                   | 204                                     | 2 200   | 1 100  |
| 280                 | 310   | 316   | 460   | –     | –     | 4     | 4        | 2 160               | 3 350                   | 345                                     | 2 200   | 780  |
| 280                 | 310   | 316   | 460   | –     | –     | 4     | 4        | 2 160               | 3 350                   | 345                                     | 2 200   | 780  |
| 280                 | 310   | 316   | 460   | –     | –     | 4     | 4        | 2 160               | 3 350                   | 345                                     | 2 200   | 800  |
| 286                 | 334,3 | 339,7 | 514   | –     | –     | 5     | 5        | 1 900               | 2 600                   | 198                                     | 2 000   | 900  |
| 286                 | 321,3 | 326,7 | 514   | –     | –     | 5     | 5        | 3 100               | 4 500                   | 435                                     | 1 800   | 660  |
| 294                 | –     | –     | 353   | 351   | 345   | 3     | 3        | 490                 | 850                     | 87                                      | 2 800   | –  |
| 289                 | 296   | 302   | 341   | –     | –     | 2     | 1        | 255                 | 500                     | 43                                      | 3 200   | –  |
| 288                 | 303   | 309   | 369   | –     | –     | 2     | 1,5      | 440                 | 800                     | 68                                      | 2 800   | –  |
| 288                 | 303   | 309   | 369   | –     | –     | 2     | 1,5      | 865                 | 1 760                   | 188                                     | 2 800   | 1 100  |
| 295                 | –     | –     | 405   | 386   | 382   | 3     | 3        | 680                 | 1 100                   | 112                                     | 2 800   | 1 500  |
| 295                 | –     | –     | 405   | 386   | 382   | 3     | 3        | 680                 | 1 100                   | 112                                     | 2 800   | 1 500  |
| 295                 | 312   | 321   | 405   | –     | –     | 3     | 3        | 680                 | 1 100                   | 96                                      | 2 800   | 1 550  |
| 295                 | 312   | 321   | 405   | –     | –     | 3     | 3        | 680                 | 1 100                   | 96                                      | 2 800   | 1 550  |
| 295                 | 312   | 321   | 405   | –     | –     | 3     | 3        | 680                 | 1 100                   | 96                                      | 2 800   | 1 550  |
| 295                 | 312   | 321   | 405   | –     | –     | 3     | 3        | 695                 | 1 140                   | 86                                      | 2 800   | 1 530  |

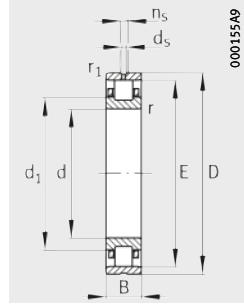


# Cylindrical roller bearings with cage

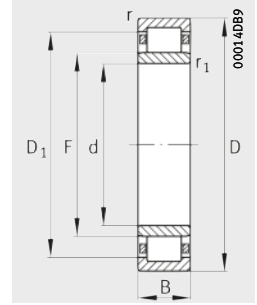
Single row  
Non-locating  
bearings



Design 1  
N



Design 2  
N with lubrication  
groove and holes

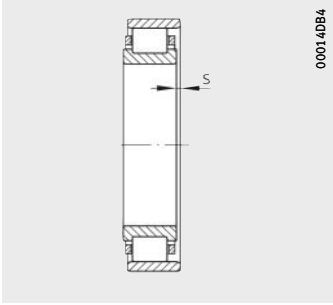


Design 3  
NU

Dimension table (continued) · Dimensions in mm

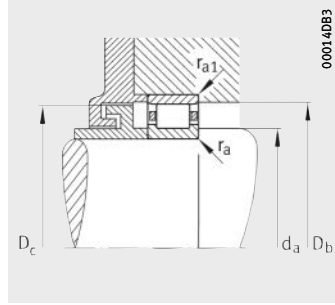
| Designation   | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |     |     |     |                |                 |     |     |                |                |                |                |
|---------------|-------------|------------------|------------|-----|-----|-----|----------------|-----------------|-----|-----|----------------|----------------|----------------|----------------|
|               |             |                  | d          | D   | B   | r   | r <sub>1</sub> | s <sup>1)</sup> | E   | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| NU2056-E-M1   | 3           | 41,8             | <b>280</b> | 420 | 82  | 4   | 4              | 6,2             | 390 | 314 | 376,3          | —              | —              | —              |
| NU3056-M1     | 3           | 53,2             | <b>280</b> | 420 | 106 | 4   | 4              | 9,8             | 384 | 316 | 371,3          | —              | —              | —              |
| NU3156-M1     | 3           | 96,6             | <b>280</b> | 460 | 146 | 5   | 5              | 14              | 424 | 324 | 407,6          | —              | —              | —              |
| NU256-E-M1    | 3           | 72,1             | <b>280</b> | 500 | 80  | 5   | 5              | 6,3             | 449 | 337 | 430,8          | —              | —              | —              |
| NU256-E-M1A   | 3           | 72,1             | <b>280</b> | 500 | 80  | 5   | 5              | 6,3             | 449 | 337 | 430,8          | —              | —              | —              |
| NU1256-M1     | 3           | 81,2             | <b>280</b> | 500 | 90  | 5   | 5              | 6,7             | 453 | 333 | 434            | —              | —              | —              |
| NU2256-E-M1   | 3           | 114              | <b>280</b> | 500 | 130 | 5   | 5              | 10,5            | 453 | 333 | 436            | —              | —              | —              |
| NU2256-E-M1A  | 3           | 118              | <b>280</b> | 500 | 130 | 5   | 5              | 10,5            | 453 | 333 | 436            | —              | —              | —              |
| NU2256-E-MP1A | 3           | 113              | <b>280</b> | 500 | 130 | 5   | 5              | 10,5            | 453 | 333 | 436            | —              | —              | —              |
| NU356-E-M1    | 3           | 147              | <b>280</b> | 580 | 108 | 6   | 6              | 8,7             | 512 | 362 | 488            | —              | —              | —              |
| NU2356-EX-M1  | 3           | 234              | <b>280</b> | 580 | 175 | 6   | 6              | 13,8            | 521 | 351 | 493,8          | —              | —              | —              |
| Z-527791.ZL   | 2           | 9,65             | <b>300</b> | 380 | 38  | 2,1 | 2,1            | 7               | 362 | —   | —              | 329,9          | 3,2            | 9,5            |
| NU1860-M1     | 3           | 9,96             | <b>300</b> | 380 | 38  | 2,1 | 1,5            | 4,3             | 362 | 322 | 355,2          | —              | —              | —              |
| N2860-M1      | 1           | 12,8             | <b>300</b> | 380 | 48  | 2,1 | 1,5            | 5,3             | 362 | —   | —              | 328,7          | —              | —              |
| NU2860-M1     | 3           | 12,9             | <b>300</b> | 380 | 48  | 2,1 | 1,5            | 5,3             | 362 | 322 | 355,2          | —              | —              | —              |
| NU3860-M1     | 3           | 16,4             | <b>300</b> | 380 | 60  | 2,1 | 1,5            | 6               | 362 | 322 | 355,2          | —              | —              | —              |
| NU1960-M1     | 3           | 23,7             | <b>300</b> | 420 | 56  | 3   | 3              | 6,5             | 390 | 330 | 378            | —              | —              | —              |
| NU3960-E-M1   | 3           | 38,6             | <b>300</b> | 420 | 90  | 3   | 3              | 7,5             | 394 | 330 | 383,3          | —              | —              | —              |
| NU3960-E-M1A  | 3           | 38,6             | <b>300</b> | 420 | 90  | 3   | 3              | 7,5             | 394 | 330 | 383,3          | —              | —              | —              |
| N1060-M1      | 1           | 44,3             | <b>300</b> | 460 | 74  | 4   | 4              | 7,9             | 420 | —   | —              | 355,7          | —              | —              |
| NU1060-M1     | 3           | 44,6             | <b>300</b> | 460 | 74  | 4   | 4              | 7,9             | 420 | 340 | 405,2          | —              | —              | —              |
| NU1060-M1-C3  | 3           | 44,6             | <b>300</b> | 460 | 74  | 4   | 4              | 7,9             | 420 | 340 | 405,2          | —              | —              | —              |
| NU1060-M1A    | 3           | 44,6             | <b>300</b> | 460 | 74  | 4   | 4              | 7,9             | 420 | 340 | 405,2          | —              | —              | —              |
| NU1060-MP1A   | 3           | 43,5             | <b>300</b> | 460 | 74  | 4   | 4              | 7,9             | 420 | 340 | 405,2          | —              | —              | —              |
| NU3060-M1     | 3           | 74               | <b>300</b> | 460 | 118 | 4   | 4              | 10,5            | 420 | 340 | 405,2          | —              | —              | —              |
| NU3160-M1     | 3           | 126              | <b>300</b> | 500 | 160 | 5   | 5              | 4,2             | 460 | 348 | 442,4          | —              | —              | —              |
| NU260-E-M1    | 3           | 90,4             | <b>300</b> | 540 | 85  | 5   | 5              | 6,9             | 484 | 364 | 464,6          | —              | —              | —              |
| NU260-E-M1A   | 3           | 90,4             | <b>300</b> | 540 | 85  | 5   | 5              | 6,9             | 484 | 364 | 464,6          | —              | —              | —              |
| NU1260-M1     | 3           | 103              | <b>300</b> | 540 | 98  | 5   | 5              | 7,2             | 487 | 359 | 466,4          | —              | —              | —              |
| NU2260-EX-MPA | 3           | 147              | <b>300</b> | 540 | 140 | 5   | 5              | 12,2            | 495 | 355 | 472,6          | —              | —              | —              |
| NU2260-EX-M1  | 3           | 143              | <b>300</b> | 540 | 140 | 5   | 5              | 12,2            | 495 | 355 | 472,6          | —              | —              | —              |
| NU2260-EX-M1A | 3           | 143              | <b>300</b> | 540 | 140 | 5   | 5              | 12,2            | 495 | 355 | 472,6          | —              | —              | —              |
| NU360-E-M1    | 3           | 171              | <b>300</b> | 620 | 109 | 7,5 | 7,5            | 8,9             | 542 | 392 | 518            | —              | —              | —              |





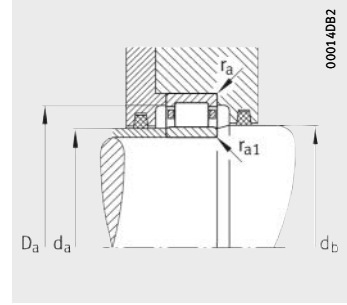
000140B4

1) Axial displacement "s" for N and NU



000140B3

Mounting dimensions for N



000140B2

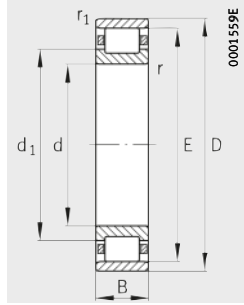
Mounting dimensions for NU

| Mounting dimensions |      |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$               |      | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
| min.                | max. | min.  | max.  | min.  | max.  | max.  | max.     |                     |                         |                                      |  |   |
| 295                 | 311  | 317   | 405   | –     | –     | 3     | 3        | 1 220               | 2 160                   | 224                                  | 2 600  | 1 100   |
| 295                 | 312  | 320   | 405   | –     | –     | 3     | 3        | 1 340               | 2 600                   | 275                                  | 2 600  | 1 000   |
| 300                 | 321  | 327   | 440   | –     | –     | 4     | 4        | 2 080               | 3 650                   | 370                                  | 2 200  | 950   |
| 300                 | 334  | 340   | 480   | –     | –     | 4     | 4        | 1 400               | 2 000                   | 163                                  | 2 200  | 1 020   |
| 300                 | 334  | 340   | 480   | –     | –     | 4     | 4        | 1 400               | 2 000                   | 163                                  | 2 200  | 1 020   |
| 300                 | 330  | 336   | 480   | –     | –     | 4     | 4        | 1 530               | 2 200                   | 215                                  | 2 200  | 1 000   |
| 300                 | 330  | 336   | 480   | –     | –     | 4     | 4        | 2 280               | 3 600                   | 360                                  | 2 000  | 720   |
| 300                 | 330  | 336   | 480   | –     | –     | 4     | 4        | 2 280               | 3 600                   | 360                                  | 2 000  | 720   |
| 300                 | 330  | 336   | 480   | –     | –     | 4     | 4        | 2 280               | 3 600                   | 360                                  | 2 000  | 700   |
| 306                 | 359  | 366   | 554   | –     | –     | 5     | 5        | 2 160               | 3 050                   | 224                                  | 1 900  | 790   |
| 306                 | 348  | 354   | 554   | –     | –     | 5     | 5        | 3 550               | 5 200                   | 495                                  | 1 600  | 590   |
| 310                 | –    | –     | 370   | 366   | 358   | 2,1   | 2,1      | 204                 | 325                     | 25                                   | 2 800  | –   |
| 310                 | 319  | 325   | 370   | –     | –     | 2     | 1,5      | 335                 | 640                     | 55                                   | 2 800  | –   |
| 310                 | –    | –     | 370   | 366   | 358   | 2     | 1,5      | 475                 | 1 000                   | 101                                  | 2 800  | 1 200   |
| 310                 | 319  | 325   | 370   | –     | –     | 2     | 1,5      | 475                 | 1 000                   | 101                                  | 2 800  | 1 200   |
| 310                 | 319  | 325   | 370   | –     | –     | 2     | 1,5      | 610                 | 1 400                   | 143                                  | 2 800  | 1 100   |
| 312                 | 327  | 333   | 408   | –     | –     | 2,5   | 2,5      | 600                 | 1 020                   | 87                                   | 2 800  | –   |
| 312                 | 327  | 333   | 408   | –     | –     | 2,5   | 2,5      | 1 180               | 2 360                   | 242                                  | 2 600  | 950   |
| 312                 | 327  | 333   | 408   | –     | –     | 2,5   | 2,5      | 1 180               | 2 360                   | 242                                  | 2 600  | 950   |
| 315                 | –    | –     | 445   | 422   | 418   | 3     | 3        | 900                 | 1 430                   | 139                                  | 2 400  | 1 400   |
| 315                 | 336  | 345   | 445   | –     | –     | 3     | 3        | 900                 | 1 430                   | 120                                  | 2 400  | 1 390   |
| 315                 | 336  | 345   | 445   | –     | –     | 3     | 3        | 900                 | 1 430                   | 120                                  | 2 400  | 1 390   |
| 315                 | 336  | 345   | 445   | –     | –     | 3     | 3        | 900                 | 1 430                   | 120                                  | 2 400  | 1 390   |
| 315                 | 336  | 345   | 445   | –     | –     | 3     | 3        | 900                 | 1 430                   | 105                                  | 2 400  | 1 390   |
| 315                 | 336  | 344   | 445   | –     | –     | 3     | 3        | 1 700               | 3 250                   | 335                                  | 2 400  | 900   |
| 320                 | 345  | 351   | 480   | –     | –     | 4     | 4        | 2 500               | 4 300                   | 435                                  | 2 000  | 850   |
| 320                 | 359  | 367   | 520   | –     | –     | 4     | 4        | 1 600               | 2 320                   | 182                                  | 2 000  | 920   |
| 320                 | 359  | 367   | 520   | –     | –     | 4     | 4        | 1 600               | 2 320                   | 182                                  | 2 000  | 920   |
| 320                 | –    | –     | 520   | 491   | 483   | 4     | 4        | 1 730               | 2 500                   | 242                                  | 2 000  | 950   |
| 320                 | 352  | 358   | 520   | –     | –     | 4     | 4        | 2 550               | 3 900                   | 375                                  | 1 200  | 670   |
| 320                 | 352  | 358   | 520   | –     | –     | 4     | 4        | 2 700               | 4 150                   | 395                                  | 1 900  | 650   |
| 320                 | 352  | 358   | 520   | –     | –     | 4     | 4        | 2 700               | 4 150                   | 395                                  | 1 900  | 650   |
| 332                 | 389  | 395   | 588   | –     | –     | 6     | 6        | 2 280               | 3 250                   | 238                                  | 1 800  | 750   |

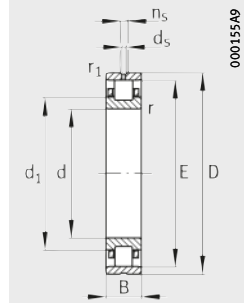


# Cylindrical roller bearings with cage

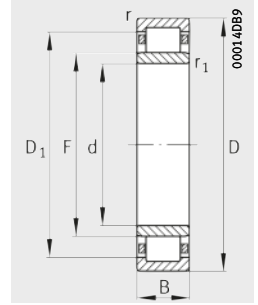
Single row  
Non-locating  
bearings



Design 1  
N



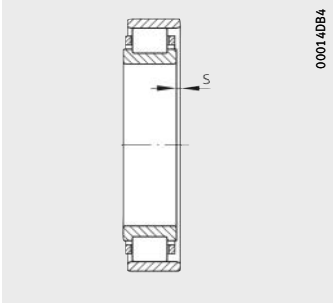
Design 2  
N with lubrication  
groove and holes



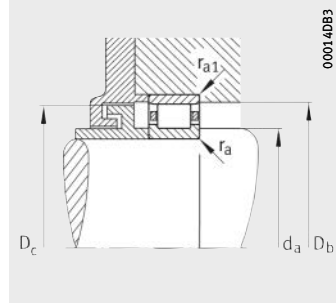
Design 3  
NU

Dimension table (continued) · Dimensions in mm

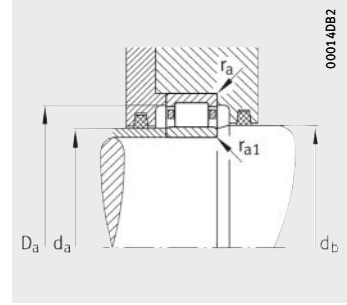
| Designation   | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |       |       |                |                |                |                |
|---------------|-------------|------------------|------------|-----|-----|------|----------------|-----------------|-------|-------|----------------|----------------|----------------|----------------|
|               |             |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E     | F     | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|               |             |                  |            |     |     | min. | min.           |                 |       |       | ≈              | ≈              |                |                |
| Z-527454.ZL   | 2           | 10,2             | 320        | 400 | 38  | 2    | 2              | 7               | 381   | –     | –              | 349            | 3,2            | 9,5            |
| NU1864-M1     | 3           | 10,8             | 320        | 400 | 38  | 2,1  | 1,5            | 4,3             | 381   | 341   | 373,8          | –              | –              | –              |
| NU3864-M1     | 3           | 17,5             | 320        | 400 | 60  | 2,1  | 1,5            | 6               | 381   | 341   | 373,8          | –              | –              | –              |
| NU1964-M1     | 3           | 25,1             | 320        | 440 | 56  | 3    | 3              | 6,2             | 410   | 350   | 398            | –              | –              | –              |
| NU2964-M1     | 3           | 33,2             | 320        | 440 | 72  | 3    | 3              | 7               | 410   | 350   | 398            | –              | –              | –              |
| NU3964-E-M1   | 3           | 41,5             | 320        | 440 | 90  | 3    | 3              | 4,7             | 414   | 350   | 403,3          | –              | –              | –              |
| N1064-M1      | 1           | 46,5             | 320        | 480 | 74  | 4    | 4              | 8               | 440   | –     | –              | 375,4          | –              | –              |
| NU1064-M1     | 3           | 46,9             | 320        | 480 | 74  | 4    | 4              | 8               | 440   | 360   | 425,1          | –              | –              | –              |
| NU1064-M1-C3  | 3           | 46,9             | 320        | 480 | 74  | 4    | 4              | 8               | 440   | 360   | 425,1          | –              | –              | –              |
| NU1064-M1A    | 3           | 46,9             | 320        | 480 | 74  | 4    | 4              | 8               | 440   | 360   | 425,1          | –              | –              | –              |
| NU1064-MP1A   | 3           | 45,8             | 320        | 480 | 74  | 4    | 4              | 8               | 440   | 360   | 425,1          | –              | –              | –              |
| NU3064-M1     | 3           | 79,3             | 320        | 480 | 121 | 4    | 4              | 11,5            | 440   | 360   | 425,1          | –              | –              | –              |
| NU3164-M1     | 3           | 168              | 320        | 540 | 176 | 5    | 5              | 12              | 496   | 368   | 475,4          | –              | –              | –              |
| NU264-EX-M1   | 3           | 113              | 320        | 580 | 92  | 5    | 5              | 7,5             | 520   | 392   | 499,4          | –              | –              | –              |
| NU264-EX-M1A  | 3           | 113              | 320        | 580 | 92  | 5    | 5              | 7,5             | 520   | 392   | 499,4          | –              | –              | –              |
| NU1264-M1     | 3           | 130              | 320        | 580 | 105 | 5    | 5              | 7,3             | 523   | 383   | 500,6          | –              | –              | –              |
| NU2264-EX-M1  | 3           | 180              | 320        | 580 | 150 | 5    | 5              | 11,9            | 530   | 380   | 506            | –              | –              | –              |
| NU2264-EX-M1A | 3           | 184              | 320        | 580 | 150 | 5    | 5              | 11,9            | 530   | 380   | 506            | –              | –              | –              |
| NU364-E-M1    | 3           | 214              | 320        | 670 | 112 | 7,5  | 7,5            | 8,9             | 580   | 420   | 554            | –              | –              | –              |
| NU2364-E-M1   | 3           | 356              | 320        | 670 | 200 | 7,5  | 7,5            | 16              | 602   | 402   | 570            | –              | –              | –              |
| Z-527455.ZL   | 2           | 10,6             | 340        | 420 | 38  | 2,1  | 2,1            | 7               | 401,5 | –     | –              | 369,3          | 3,2            | 9,5            |
| NU1868-M1     | 3           | 11,3             | 340        | 420 | 38  | 2,1  | 1,5            | 4,3             | 401,5 | 361,5 | 394,7          | –              | –              | –              |
| NU3868-M1     | 3           | 18,4             | 340        | 420 | 60  | 2,1  | 1,5            | 6               | 401,5 | 361,5 | 394,7          | –              | –              | –              |
| NU1968-M1     | 3           | 27,2             | 340        | 460 | 56  | 3    | 3              | 6,5             | 430   | 370   | 418            | –              | –              | –              |
| NU2968-M1     | 3           | 34,6             | 340        | 460 | 72  | 3    | 3              | 7               | 430   | 370   | 418            | –              | –              | –              |
| NU3968-E-M1   | 3           | 43,8             | 340        | 460 | 90  | 3    | 3              | 4,7             | 434   | 370   | 423,3          | –              | –              | –              |
| NU1068-MPA    | 3           | 65,1             | 340        | 520 | 82  | 5    | 5              | 8,9             | 475   | 385   | 458,2          | –              | –              | –              |
| N1068-M1      | 1           | 62,8             | 340        | 520 | 82  | 5    | 5              | 8,9             | 475   | –     | –              | 402,2          | –              | –              |
| NU1068-M1     | 3           | 63,2             | 340        | 520 | 82  | 5    | 5              | 8,9             | 475   | 385   | 458,2          | –              | –              | –              |
| NU1068-M1-C3  | 3           | 63,2             | 340        | 520 | 82  | 5    | 5              | 8,9             | 475   | 385   | 458,2          | –              | –              | –              |
| NU1068-M1A    | 3           | 63,2             | 340        | 520 | 82  | 5    | 5              | 8,9             | 475   | 385   | 458,2          | –              | –              | –              |
| NU3168-M1A    | 3           | 209              | 340        | 580 | 190 | 5    | 5              | 17,3            | 527   | 399   | 507,2          | –              | –              | –              |
| NU268-E-M1    | 3           | 133              | 340        | 620 | 92  | 6    | 6              | 7,4             | 547   | 419   | 526,4          | –              | –              | –              |
| NU1268-M1     | 3           | 165              | 340        | 620 | 118 | 6    | 6              | 8,3             | 558   | 408   | 534            | –              | –              | –              |
| NU2268-E-M1   | 3           | 229              | 340        | 620 | 165 | 6    | 6              | 13,3            | 558   | 408   | 534            | –              | –              | –              |



1) Axial displacement "s"  
for N and NU



Mounting dimensions  
for N



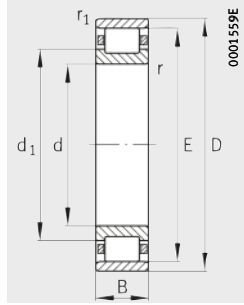
Mounting dimensions  
for NU

| Mounting dimensions |       |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|---|---|--|
| $d_a$               |       | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |   |   |  |
| min.                | max.  | min.  | max.  | min.  | max.  | max.  | max.     |                     |                         |   |   |  |
| 329                 | –     | –     | 391   | 385   | 377   | 2     | 2        | 212                 | 360                     | 27                                      | 2 800   | –  |
| 330                 | 338   | 344   | 390   | –     | –     | 2     | 1,5      | 345                 | 695                     | 58                                      | 2 800   | –  |
| 330                 | 338   | 344   | 390   | –     | –     | 2     | 1,5      | 630                 | 1 500                   | 151                                     | 2 800   | 1 000  |
| 332                 | 346   | 354   | 428   | –     | –     | 2,5   | 2,5      | 620                 | 1 100                   | 91                                      | 2 600   | –  |
| 332                 | 346   | 354   | 428   | –     | –     | 2,5   | 2,5      | 915                 | 1 800                   | 181                                     | 2 400   | 1 100  |
| 332                 | 346   | 354   | 428   | –     | –     | 2,5   | 2,5      | 1 220               | 2 550                   | 255                                     | 2 400   | 900  |
| 335                 | –     | –     | 465   | 443   | 437   | 3     | 3        | 915                 | 1 500                   | 144                                     | 2 400   | 1 300  |
| 335                 | 356   | 365   | 465   | –     | –     | 3     | 3        | 915                 | 1 500                   | 124                                     | 2 400   | 1 300  |
| 335                 | 356   | 365   | 465   | –     | –     | 3     | 3        | 915                 | 1 500                   | 124                                     | 2 400   | 1 300  |
| 335                 | 356   | 365   | 465   | –     | –     | 3     | 3        | 915                 | 1 500                   | 124                                     | 2 400   | 1 300  |
| 335                 | 356   | 365   | 465   | –     | –     | 3     | 3        | 915                 | 1 500                   | 108                                     | 2 400   | 1 300  |
| 335                 | 356   | 364   | 465   | –     | –     | 3     | 3        | 1 760               | 3 450                   | 345                                     | 2 200   | 850  |
| 340                 | 364   | 372   | 520   | –     | –     | 4     | 4        | 3 250               | 5 600                   | 550                                     | 1 900   | 700  |
| 340                 | 388,5 | 395,5 | 560   | –     | –     | 4     | 4        | 1 800               | 2 700                   | 204                                     | 1 900   | 830  |
| 340                 | 388,5 | 395,5 | 560   | –     | –     | 4     | 4        | 1 800               | 2 700                   | 204                                     | 1 900   | 830  |
| 340                 | 380   | 386   | 560   | –     | –     | 4     | 4        | 2 080               | 3 000                   | 280                                     | 1 900   | 850  |
| 340                 | 376,5 | 383,5 | 560   | –     | –     | 4     | 4        | 3 150               | 4 900                   | 460                                     | 1 600   | 570  |
| 340                 | 376,5 | 383,5 | 560   | –     | –     | 4     | 4        | 3 150               | 4 900                   | 460                                     | 1 600   | 560  |
| 352                 | 416   | 424   | 638   | –     | –     | 6     | 6        | 2 550               | 3 750                   | 265                                     | 1 600   | 650  |
| 352                 | 398   | 405   | 638   | –     | –     | 6     | 6        | 4 550               | 6 800                   | 620                                     | 1 400   | 480  |
| 350                 | –     | –     | 410   | 405   | 398   | 2,1   | 2,1      | 212                 | 360                     | 26,5                                    | 2 800   | –  |
| 350                 | 358   | 365   | 410   | –     | –     | 2,1   | 1,5      | 360                 | 735                     | 61                                      | 2 800   | –  |
| 350                 | 358   | 365   | 410   | –     | –     | 2     | 1,5      | 640                 | 1 560                   | 156                                     | 2 600   | 950  |
| 352                 | 366   | 374   | 448   | –     | –     | 2,5   | 2,5      | 640                 | 1 160                   | 96                                      | 2 600   | –  |
| 352                 | 366   | 374   | 448   | –     | –     | 2,5   | 2,5      | 950                 | 1 930                   | 190                                     | 2 400   | 950  |
| 352                 | 366   | 374   | 448   | –     | –     | 2,5   | 2,5      | 1 250               | 2 600                   | 260                                     | 2 400   | 850  |
| 357                 | 381   | 390   | 503   | –     | –     | 4     | 4        | 1 080               | 1 760                   | 141                                     | 2 200   | 1 200  |
| 357                 | –     | –     | 503   | 478,5 | 471,5 | 4     | 4        | 1 120               | 1 830                   | 169                                     | 2 200   | 1 200  |
| 357                 | 381   | 390   | 503   | –     | –     | 4     | 4        | 1 120               | 1 830                   | 147                                     | 2 200   | 1 190  |
| 357                 | 381   | 390   | 503   | –     | –     | 4     | 4        | 1 120               | 1 830                   | 147                                     | 2 200   | 1 190  |
| 357                 | 381   | 390   | 503   | –     | –     | 4     | 4        | 1 120               | 1 830                   | 147                                     | 2 200   | 1 190  |
| 360                 | 395   | 403   | 560   | –     | –     | 4     | 4        | 3 200               | 5 600                   | 540                                     | 1 800   | 700  |
| 366                 | 415   | 423   | 594   | –     | –     | 5     | 5        | 1 930               | 3 000                   | 225                                     | 1 800   | 750  |
| 366                 | 404   | 412   | 594   | –     | –     | 5     | 5        | 2 360               | 3 450                   | 315                                     | 1 800   | 800  |
| 366                 | 404   | 412   | 594   | –     | –     | 5     | 5        | 3 450               | 5 700                   | 540                                     | 1 500   | 520  |

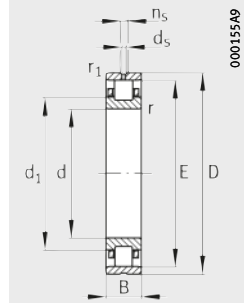


# Cylindrical roller bearings with cage

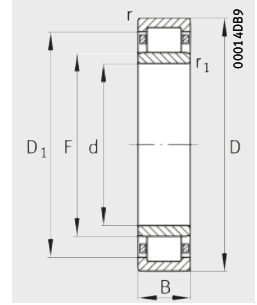
Single row  
Non-locating  
bearings



Design 1  
N



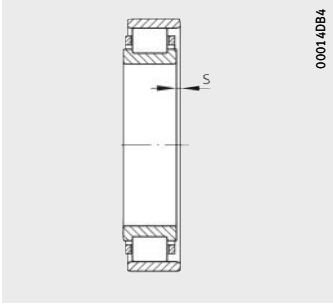
Design 2  
N with lubrication  
groove and holes



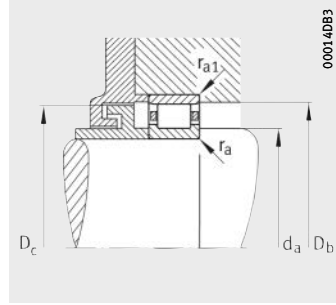
Design 3  
NU

Dimension table (continued) · Dimensions in mm

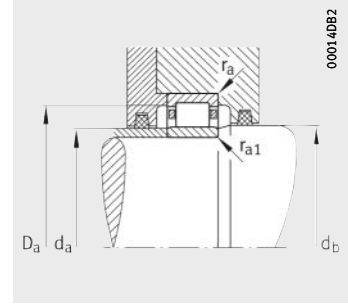
| Designation         | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |       |       |                |                |                |                |
|---------------------|-------------|------------------|------------|-----|-----|------|----------------|-----------------|-------|-------|----------------|----------------|----------------|----------------|
|                     |             |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E     | F     | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|                     |             |                  |            |     |     | min. | min.           |                 |       |       | ≈              | ≈              |                |                |
| <b>NU2268-E-M1A</b> | 3           | 233              | <b>340</b> | 620 | 165 | 6    | 6              | 13,3            | 558   | 408   | 534            | –              | –              | –              |
| <b>NU368-E-M1</b>   | 3           | 247              | <b>340</b> | 710 | 118 | 7,5  | 7,5            | 9,7             | 614,4 | 450,4 | 588            | –              | –              | –              |
| <b>NU2368-E-M1</b>  | 3           | 419              | <b>340</b> | 710 | 212 | 7,5  | 7,5            | 15,5            | 635   | 425   | 601,4          | –              | –              | –              |
| <b>Z-527456.ZL</b>  | 2           | 11,2             | <b>360</b> | 440 | 38  | 2,1  | 2,1            | 7               | 421,5 | –     | –              | 389,4          | 3,2            | 9,5            |
| <b>NU1872-M1</b>    | 3           | 12               | <b>360</b> | 440 | 38  | 2,1  | 1,5            | 4,3             | 421,5 | 381,5 | 414,7          | –              | –              | –              |
| <b>NU3872-M1</b>    | 3           | 19,4             | <b>360</b> | 440 | 60  | 2,1  | 1,5            | 6               | 421,5 | 381,5 | 414,7          | –              | –              | –              |
| <b>NU1972-M1</b>    | 3           | 27,7             | <b>360</b> | 480 | 56  | 3    | 3              | 6,2             | 450   | 390   | 438,5          | –              | –              | –              |
| <b>NU2972-M1</b>    | 3           | 37,2             | <b>360</b> | 480 | 72  | 3    | 3              | 4               | 450   | 390   | 440            | –              | –              | –              |
| <b>NU3972-E-M1</b>  | 3           | 45,6             | <b>360</b> | 480 | 90  | 3    | 3              | 4,7             | 454   | 390   | 443,3          | –              | –              | –              |
| <b>N1072-M1</b>     | 1           | 65,3             | <b>360</b> | 540 | 82  | 5    | 5              | 8,9             | 495   | –     | –              | 421,6          | –              | –              |
| <b>NU1072-M1</b>    | 3           | 65,9             | <b>360</b> | 540 | 82  | 5    | 5              | 8,9             | 495   | 405   | 478,1          | –              | –              | –              |
| <b>NU1072-M1-C3</b> | 3           | 65,9             | <b>360</b> | 540 | 82  | 5    | 5              | 8,9             | 495   | 405   | 478,1          | –              | –              | –              |
| <b>NU1072-M1A</b>   | 3           | 65,9             | <b>360</b> | 540 | 82  | 5    | 5              | 8,9             | 495   | 405   | 478,1          | –              | –              | –              |
| <b>NU1072-MP1A</b>  | 3           | 64,2             | <b>360</b> | 540 | 82  | 5    | 5              | 8,9             | 495   | 405   | 478,1          | –              | –              | –              |
| <b>NU1072-MPA</b>   | 3           | 64,2             | <b>360</b> | 540 | 82  | 5    | 5              | 8,9             | 495   | 405   | 478,1          | –              | –              | –              |
| <b>NU3072-M1</b>    | 3           | 112              | <b>360</b> | 540 | 134 | 5    | 5              | 11,5            | 495   | 405   | 478,1          | –              | –              | –              |
| <b>NU3172-M1</b>    | 3           | 220              | <b>360</b> | 600 | 192 | 5    | 5              | 19              | 548   | 420   | 527            | –              | –              | –              |
| <b>NU272-E-M1</b>   | 3           | 149              | <b>360</b> | 650 | 95  | 6    | 6              | 9,5             | 579   | 451   | 558,5          | –              | –              | –              |
| <b>NU272-E-M1A</b>  | 3           | 151              | <b>360</b> | 650 | 95  | 6    | 6              | 9,5             | 579   | 451   | 558,5          | –              | –              | –              |
| <b>NU1272-M1</b>    | 3           | 187              | <b>360</b> | 650 | 122 | 6    | 6              | 8,2             | 589   | 429   | 563,5          | –              | –              | –              |
| <b>NU2272-E-M1</b>  | 3           | 254              | <b>360</b> | 650 | 170 | 6    | 6              | 15              | 588   | 428   | 562            | –              | –              | –              |
| <b>NU2272-E-M1A</b> | 3           | 258              | <b>360</b> | 650 | 170 | 6    | 6              | 15              | 588   | 428   | 562            | –              | –              | –              |
| <b>NU2372-E-M1</b>  | 3           | 498              | <b>360</b> | 750 | 224 | 7,5  | 7,5            | 19              | 665   | 445   | 630            | –              | –              | –              |
| <b>NU2372-E-M1A</b> | 3           | 498              | <b>360</b> | 750 | 224 | 7,5  | 7,5            | 19              | 665   | 445   | 630            | –              | –              | –              |
| <b>Z-526718.ZL</b>  | 2           | 18,8             | <b>380</b> | 480 | 46  | 2,1  | 2,1            | 8,5             | 455,5 | –     | –              | 415,5          | 3,2            | 9,5            |
| <b>N1876-M1</b>     | 1           | 19,1             | <b>380</b> | 480 | 46  | 2,1  | 2,1            | 5,3             | 455,5 | –     | –              | 415,5          | –              | –              |
| <b>NU1876-M1</b>    | 3           | 19,2             | <b>380</b> | 480 | 46  | 2,1  | 2,1            | 5,3             | 455,5 | 407,5 | 447,4          | –              | –              | –              |
| <b>N2876-M1</b>     | 1           | 25,3             | <b>380</b> | 480 | 60  | 2,1  | 2,1            | 6,9             | 455,5 | –     | –              | 415,5          | –              | –              |
| <b>NU2876-M1</b>    | 3           | 25,4             | <b>380</b> | 480 | 60  | 2,1  | 2,1            | 6,9             | 455,5 | 407,5 | 447,4          | –              | –              | –              |
| <b>NU3876-M1</b>    | 3           | 32,5             | <b>380</b> | 480 | 75  | 2,1  | 2,1            | 7,8             | 455,5 | 407,5 | 447,4          | –              | –              | –              |
| <b>NU1976-M1</b>    | 3           | 40,7             | <b>380</b> | 520 | 65  | 4    | 4              | 6               | 484   | 416   | 472,7          | –              | –              | –              |
| <b>N2976-M1</b>     | 3           | 52,5             | <b>380</b> | 520 | 82  | 4    | 4              | 7,2             | 486   | –     | –              | 425,9          | –              | –              |
| <b>NU2976-M1</b>    | 3           | 52,9             | <b>380</b> | 520 | 82  | 4    | 4              | 7,2             | 486   | 414   | 471,6          | –              | –              | –              |
| <b>NU2976-MP1A</b>  | 3           | 52,3             | <b>380</b> | 520 | 82  | 4    | 4              | 7,2             | 486   | 414   | 471,6          | –              | –              | –              |
| <b>NU3976-E-M1</b>  | 3           | 67               | <b>380</b> | 520 | 106 | 4    | 4              | 8,7             | 490   | 414   | 474,8          | –              | –              | –              |



1) Axial displacement "s"  
for N and NU



Mounting dimensions  
for N



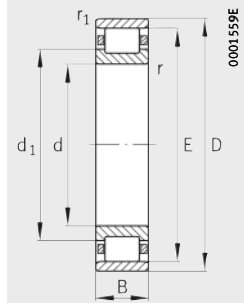
Mounting dimensions  
for NU

| Mounting dimensions |       |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|---|---|--|
| $d_a$               |       | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |   |   |  |
| min.                | max.  | min.  | max.  | min.  | max.  | max.  | max.     |                     |                         |   |   |  |
| 366                 | 404   | 412   | 594   | –     | –     | 5     | 5        | 3 450               | 5 700                   | 540                                     | 1 500   | 520  |
| 372                 | 447   | 454   | 678   | –     | –     | 6     | 6        | 2 750               | 4 150                   | 290                                     | 1 500   | 600  |
| 372                 | 421,5 | 428,5 | 678   | –     | –     | 6     | 6        | 5 000               | 7 350                   | 660                                     | 1 400   | 450  |
| 370                 | –     | –     | 430   | 425   | 418   | 2,1   | 2,1      | 220                 | 390                     | 28                                      | 2 600   | –  |
| 370                 | 378   | 385   | 430   | –     | –     | 2     | 1,5      | 365                 | 765                     | 62                                      | 2 600   | –  |
| 370                 | 378   | 385   | 430   | –     | –     | 2     | 1,5      | 670                 | 1 660                   | 163                                     | 2 400   | 900  |
| 372                 | 386   | 394   | 468   | –     | –     | 2,5   | 2,5      | 655                 | 1 220                   | 100                                     | 2 400   | –  |
| 372                 | 386   | 394   | 468   | –     | –     | 2,5   | 2,5      | 980                 | 2 040                   | 199                                     | 2 200   | 900  |
| 372                 | 386   | 394   | 468   | –     | –     | 2,5   | 2,5      | 1 290               | 2 800                   | 275                                     | 2 200   | 800  |
| 378                 | –     | –     | 523   | 499   | 491   | 4     | 4        | 1 140               | 1 900                   | 175                                     | 2 400   | 1 300  |
| 377                 | 400   | 410   | 523   | –     | –     | 4     | 4        | 1 140               | 1 900                   | 151                                     | 2 200   | 1 110  |
| 377                 | 400   | 410   | 523   | –     | –     | 4     | 4        | 1 140               | 1 900                   | 151                                     | 2 200   | 1 110  |
| 377                 | 400   | 410   | 523   | –     | –     | 4     | 4        | 1 140               | 1 900                   | 151                                     | 2 200   | 1 110  |
| 377                 | 400   | 410   | 523   | –     | –     | 4     | 4        | 1 140               | 1 900                   | 133                                     | 2 200   | 1 110  |
| 377                 | 400   | 410   | 523   | –     | –     | 4     | 4        | 1 140               | 1 900                   | 133                                     | 2 200   | 1 110  |
| 377                 | 400   | 410   | 523   | –     | –     | 4     | 4        | 2 200               | 4 400                   | 420                                     | 2 000   | 670  |
| 380                 | 416   | 424   | 580   | –     | –     | 4     | 4        | 3 350               | 6 000                   | 570                                     | 1 600   | 630  |
| 386                 | 447   | 455   | 624   | –     | –     | 5     | 5        | 2 000               | 3 150                   | 234                                     | 1 600   | 700  |
| 386                 | 447   | 455   | 624   | –     | –     | 5     | 5        | 2 000               | 3 150                   | 234                                     | 1 600   | 700  |
| 386                 | 425   | 433   | 624   | –     | –     | 5     | 5        | 2 700               | 4 000                   | 345                                     | 1 600   | 700  |
| 386                 | 424   | 432   | 624   | –     | –     | 5     | 5        | 3 600               | 5 700                   | 520                                     | 1 400   | 510  |
| 386                 | 424   | 432   | 624   | –     | –     | 5     | 5        | 3 600               | 5 700                   | 520                                     | 1 400   | 510  |
| 392                 | 441   | 449   | 718   | –     | –     | 6     | 6        | 5 500               | 8 300                   | 730                                     | 1 300   | 400  |
| 392                 | 441   | 449   | 718   | –     | –     | 6     | 6        | 5 500               | 8 300                   | 730                                     | 1 300   | 400  |
| 390                 | –     | –     | 470   | 460   | 451   | 2,1   | 2,1      | 285                 | 480                     | 34,5                                    | 2 400   | –  |
| 390                 | –     | –     | 470   | 460   | 451   | 2     | 2        | 490                 | 1 000                   | 91                                      | 2 400   | –  |
| 390                 | 404   | 411   | 470   | –     | –     | 2     | 2        | 490                 | 1 000                   | 81                                      | 2 400   | –  |
| 390                 | –     | –     | 470   | 460   | 451   | 2     | 2        | 695                 | 1 560                   | 148                                     | 2 200   | 900  |
| 390                 | 404   | 411   | 470   | –     | –     | 2     | 2        | 695                 | 1 560                   | 148                                     | 2 200   | 900  |
| 390                 | 404   | 411   | 470   | –     | –     | 2     | 2        | 900                 | 2 160                   | 208                                     | 2 200   | 800  |
| 395                 | 412   | 420   | 505   | –     | –     | 3     | 3        | 815                 | 1 500                   | 124                                     | 2 200   | –  |
| 395                 | –     | –     | 505   | 490   | 482   | 3     | 3        | 1 320               | 2 700                   | 255                                     | 2 000   | 800  |
| 395                 | 410   | 418   | 505   | –     | –     | 3     | 3        | 1 320               | 2 700                   | 260                                     | 2 000   | 800  |
| 395                 | 410   | 418   | 505   | –     | –     | 3     | 3        | 1 320               | 2 700                   | 260                                     | 2 000   | 800  |
| 395                 | 410   | 418   | 505   | –     | –     | 3     | 3        | 1 700               | 3 550                   | 340                                     | 2 000   | 700  |

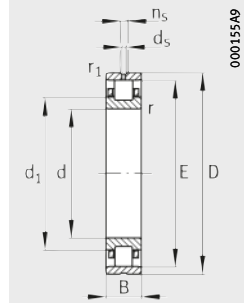


# Cylindrical roller bearings with cage

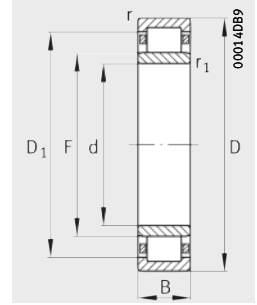
Single row  
Non-locating  
bearings



Design 1  
N



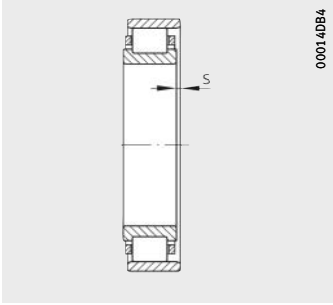
Design 2  
N with lubrication  
groove and holes



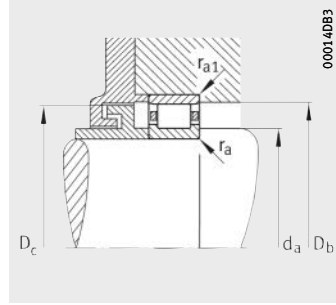
Design 3  
NU, cylindrical or  
tapered bore

Dimension table (continued) · Dimensions in mm

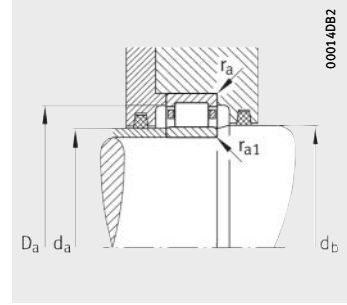
| Designation           | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |     |     |     |                |                 |       |     |                |                |                |                |
|-----------------------|-------------|------------------|------------|-----|-----|-----|----------------|-----------------|-------|-----|----------------|----------------|----------------|----------------|
|                       |             |                  | d          | D   | B   | r   | r <sub>1</sub> | s <sup>1)</sup> | E     | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| <b>N1076-M1</b>       | 1           | 67,2             | <b>380</b> | 560 | 82  | 5   | 5              | 9               | 515   | –   | –              | 441,6          | –              | –              |
| <b>N1076-M1B</b>      | 1           | 67,6             | <b>380</b> | 560 | 82  | 5   | 5              | 9               | 515   | –   | –              | 441,6          | –              | –              |
| <b>NU1076-M1</b>      | 3           | 69,1             | <b>380</b> | 560 | 82  | 5   | 5              | 9               | 515   | 425 | 498,1          | –              | –              | –              |
| <b>NU1076-M1-C3</b>   | 3           | 69,1             | <b>380</b> | 560 | 82  | 5   | 5              | 9               | 515   | 425 | 498,1          | –              | –              | –              |
| <b>NU1076-M1A</b>     | 3           | 69,1             | <b>380</b> | 560 | 82  | 5   | 5              | 9               | 515   | 425 | 498,1          | –              | –              | –              |
| <b>NU3076-M1</b>      | 3           | 117              | <b>380</b> | 560 | 135 | 5   | 5              | 12,5            | 515   | 425 | 498,1          | –              | –              | –              |
| <b>NU3176-M1</b>      | 3           | 231              | <b>380</b> | 620 | 194 | 5   | 5              | 19,5            | 568   | 440 | 547            | –              | –              | –              |
| <b>NU276-E-M1</b>     | 3           | 162              | <b>380</b> | 680 | 95  | 6   | 6              | 8               | 622   | 494 | 601            | –              | –              | –              |
| <b>NU1276-M1</b>      | 3           | 211              | <b>380</b> | 680 | 132 | 6   | 6              | 9,5             | 619   | 449 | 592            | –              | –              | –              |
| <b>NU2276-E-M1</b>    | 3           | 288              | <b>380</b> | 680 | 175 | 6   | 6              | 13,8            | 615   | 451 | 588,8          | –              | –              | –              |
| <b>NU2276-E-M1A</b>   | 3           | 293              | <b>380</b> | 680 | 175 | 6   | 6              | 13,8            | 615   | 451 | 588,8          | –              | –              | –              |
| <b>Z-527457.ZL</b>    | 2           | 19,4             | <b>400</b> | 500 | 46  | 2,1 | 2,1            | 8               | 476   | –   | –              | 437,4          | 3,2            | 9,5            |
| <b>NU1880-M1</b>      | 3           | 20,3             | <b>400</b> | 500 | 46  | 2,1 | 2,1            | 5,3             | 476   | 428 | 468            | –              | –              | –              |
| <b>NU3880-M1</b>      | 3           | 34               | <b>400</b> | 500 | 75  | 2,1 | 2,1            | 7,8             | 476   | 428 | 468            | –              | –              | –              |
| <b>NU1980-M1</b>      | 3           | 41,9             | <b>400</b> | 540 | 65  | 4   | 4              | 7,2             | 504   | 436 | 492,7          | –              | –              | –              |
| <b>NU2980-M1</b>      | 3           | 55,3             | <b>400</b> | 540 | 82  | 4   | 4              | 7,2             | 506   | 434 | 494            | –              | –              | –              |
| <b>NU3980-E-M1</b>    | 3           | 70,3             | <b>400</b> | 540 | 106 | 4   | 4              | 8,7             | 510   | 434 | 497,5          | –              | –              | –              |
| <b>N1080-M1</b>       | 1           | 87,9             | <b>400</b> | 600 | 90  | 5   | 5              | 9,5             | 550   | –   | –              | 469            | –              | –              |
| <b>NU1080-K-M1</b>    | 3           | 88,5             | <b>400</b> | 600 | 90  | 5   | –              | 9,5             | 550   | 450 | 531,5          | –              | –              | –              |
| <b>NU1080-M1</b>      | 3           | 90,1             | <b>400</b> | 600 | 90  | 5   | 5              | 9,5             | 550   | 450 | 531,5          | –              | –              | –              |
| <b>NU1080-M1-C3</b>   | 3           | 90,1             | <b>400</b> | 600 | 90  | 5   | 5              | 9,5             | 550   | 450 | 531,5          | –              | –              | –              |
| <b>NU1080-M1A</b>     | 3           | 90,6             | <b>400</b> | 600 | 90  | 5   | 5              | 9,5             | 550   | 450 | 531,5          | –              | –              | –              |
| <b>NU3080-M1</b>      | 3           | 153              | <b>400</b> | 600 | 148 | 5   | 5              | 12,8            | 550   | 450 | 531,5          | –              | –              | –              |
| <b>NU3180-M1</b>      | 3           | 260              | <b>400</b> | 650 | 200 | 6   | 6              | 18              | 600   | 460 | 577,5          | –              | –              | –              |
| <b>NU1280-M1</b>      | 3           | 258              | <b>400</b> | 720 | 140 | 6   | 6              | 9,8             | 654   | 474 | 625            | –              | –              | –              |
| <b>NU2280-E-M1</b>    | 3           | 342              | <b>400</b> | 720 | 185 | 6   | 6              | 15,4            | 661   | 471 | 630,5          | –              | –              | –              |
| <b>NU2280-E-M1A</b>   | 3           | 346              | <b>400</b> | 720 | 185 | 6   | 6              | 15,4            | 661   | 471 | 630,5          | –              | –              | –              |
| <b>Z-547075.01.ZL</b> | 1           | 32,2             | <b>406</b> | 502 | 76  | 4   | 2,5            | –               | 482,7 | –   | –              | 437,6          | –              | –              |
| <b>Z-547459.ZL</b>    | 1           | 33,7             | <b>406</b> | 502 | 76  | 4   | 4              | –               | 482,7 | –   | –              | 437,6          | –              | –              |
| <b>Z-527458.ZL</b>    | 2           | 21               | <b>420</b> | 520 | 46  | 2,1 | 2,1            | 8,5             | 496   | –   | –              | 457,5          | 3,2            | 12,2           |
| <b>NU1884-M1</b>      | 3           | 20,9             | <b>420</b> | 520 | 46  | 2,1 | 2,1            | 5,3             | 496   | 448 | 488            | –              | –              | –              |
| <b>NU3884-M1</b>      | 3           | 35,5             | <b>420</b> | 520 | 75  | 2,1 | 2,1            | 7,8             | 496   | 448 | 488            | –              | –              | –              |
| <b>NU1984-M1</b>      | 3           | 44,2             | <b>420</b> | 560 | 65  | 4   | 4              | 7,2             | 524   | 456 | 510,4          | –              | –              | –              |



1) Axial displacement "s"  
for N and NU



Mounting dimensions  
for N



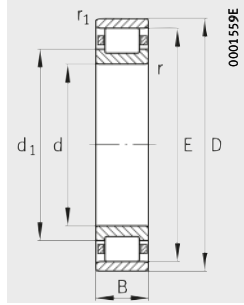
Mounting dimensions  
for NU

| Mounting dimensions |      |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|---|---|--|
| $d_a$               |      | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |   |   |  |
| min.                | max. |       |       |       |       |       |          |                     |                         |   |   |  |
| 398                 | –    | –     | 543   | 519   | 511   | 4     | 4        | 1 180               | 2 000                   | 180                                     | 2 400   | 1 250  |
| 398                 | –    | –     | 543   | 519   | 511   | 4     | 4        | 1 180               | 2 000                   | 180                                     | 2 400   | 1 250  |
| 397                 | 420  | 430   | 543   | –     | –     | 4     | 4        | 1 180               | 2 000                   | 156                                     | 2 000   | 1 050  |
| 397                 | 420  | 430   | 543   | –     | –     | 4     | 4        | 1 180               | 2 000                   | 156                                     | 2 000   | 1 050  |
| 397                 | 420  | 430   | 543   | –     | –     | 4     | 4        | 1 180               | 2 000                   | 156                                     | 2 000   | 1 050  |
| 397                 | 420  | 430   | 543   | –     | –     | 4     | 4        | 2 240               | 4 550                   | 435                                     | 1 900   | 670  |
| 400                 | 436  | 444   | 600   | –     | –     | 4     | 4        | 3 450               | 6 300                   | 600                                     | 1 600   | 600  |
| 406                 | 556  | 564   | 654   | –     | –     | 5     | 5        | 2 120               | 3 450                   | 255                                     | 1 500   | 610  |
| 406                 | 445  | 453   | 654   | –     | –     | 5     | 5        | 2 850               | 4 150                   | 370                                     | 1 500   | 700  |
| 406                 | 446  | 456   | 654   | –     | –     | 5     | 5        | 4 050               | 6 700                   | 610                                     | 1 400   | 450  |
| 406                 | 446  | 456   | 654   | –     | –     | 5     | 5        | 4 050               | 6 700                   | 610                                     | 1 400   | 450  |
| 410                 | –    | –     | 490   | 480   | 472   | 2,1   | 2,1      | 300                 | 530                     | 37                                      | 2 400   | –  |
| 410                 | 424  | 431   | 490   | –     | –     | 2,1   | 2,1      | 520                 | 1 100                   | 88                                      | 2 400   | –  |
| 410                 | 424  | 431   | 490   | –     | –     | 2     | 2        | 930                 | 2 280                   | 219                                     | 2 200   | 750  |
| 415                 | 432  | 440   | 525   | –     | –     | 3     | 3        | 800                 | 1 500                   | 123                                     | 2 200   | –  |
| 415                 | 430  | 438   | 525   | –     | –     | 3     | 3        | 1 340               | 2 750                   | 265                                     | 2 000   | 750  |
| 415                 | 430  | 438   | 525   | –     | –     | 3     | 3        | 1 760               | 3 750                   | 360                                     | 1 900   | 670  |
| 417                 | –    | –     | 583   | 554   | 546   | 4     | 4        | 1 370               | 2 320                   | 212                                     | 1 900   | 950  |
| 417                 | 445  | 455   | 583   | –     | –     | 4     | –        | 1 370               | 2 320                   | 177                                     | 1 900   | 980  |
| 417                 | 445  | 455   | 583   | –     | –     | 4     | 4        | 1 370               | 2 320                   | 177                                     | 1 900   | 980  |
| 417                 | 445  | 455   | 583   | –     | –     | 4     | 4        | 1 370               | 2 320                   | 177                                     | 1 900   | 980  |
| 417                 | 445  | 455   | 583   | –     | –     | 4     | 4        | 1 370               | 2 320                   | 177                                     | 1 900   | 980  |
| 417                 | 445  | 455   | 583   | –     | –     | 4     | 4        | 2 650               | 5 400                   | 510                                     | 1 800   | 600  |
| 426                 | 456  | 464   | 624   | –     | –     | 5     | 5        | 4 050               | 7 500                   | 690                                     | 1 400   | 530  |
| 426                 | 470  | 478   | 694   | –     | –     | 5     | 5        | 3 050               | 4 400                   | 385                                     | 1 400   | 670  |
| 426                 | 467  | 475   | 694   | –     | –     | 5     | 5        | 5 600               | 7 600                   | 670                                     | 1 300   | 850  |
| 426                 | 467  | 475   | 694   | –     | –     | 5     | 5        | 5 600               | 7 600                   | 670                                     | 1 300   | 410  |
| 421                 | –    | –     | 490   | 486   | 478   | 3     | 2,1      | 1 160               | 2 750                   | 231                                     | 2 200   | 670  |
| 421                 | –    | –     | 490   | 486   | 478   | 3     | 3        | 1 160               | 2 750                   | 231                                     | 2 200   | 670  |
| 430                 | –    | –     | 510   | 500   | 492   | 2,1   | 2,1      | 315                 | 570                     | 39,5                                    | 2 200   | –  |
| 430                 | 444  | 451   | 510   | –     | –     | 2     | 2        | 530                 | 1 140                   | 90                                      | 2 200   | –  |
| 430                 | 444  | 451   | 510   | –     | –     | 2     | 2        | 950                 | 2 400                   | 226                                     | 2 000   | 700  |
| 435                 | 452  | 460   | 545   | –     | –     | 3     | 3        | 830                 | 1 600                   | 129                                     | 2 000   | –  |

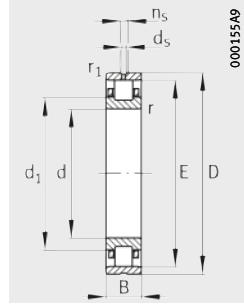


# Cylindrical roller bearings with cage

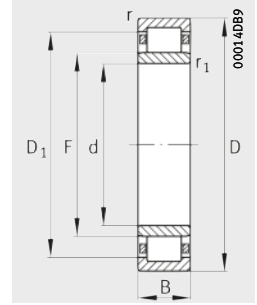
Single row  
Non-locating  
bearings



Design 1  
N



Design 2  
N with lubrication  
groove and holes

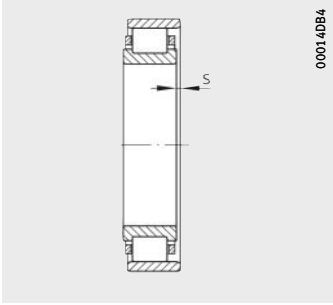


Design 3  
NU, cylindrical or  
tapered bore

**Dimension table (continued)** · Dimensions in mm

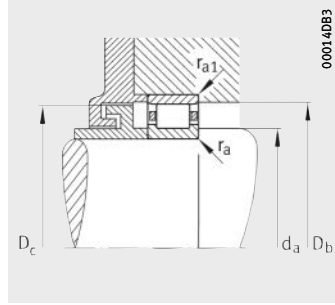
| Designation  | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |     |     |                |                |                |                |
|--------------|-------------|------------------|------------|-----|-----|------|----------------|-----------------|-----|-----|----------------|----------------|----------------|----------------|
|              |             |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E   | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|              |             |                  |            |     |     | min. | min.           |                 |     |     | ≈              | ≈              |                |                |
| NU2984-M1    | 3           | 58,6             | 420        | 560 | 82  | 4    | 4              | 6               | 526 | 454 | 511,6          | -              | -              | -              |
| NU3984-E-M1  | 3           | 73               | 420        | 560 | 106 | 4    | 4              | 5,7             | 530 | 454 | 517,5          | -              | -              | -              |
| N1084-M1     | 1           | 92,2             | 420        | 620 | 90  | 5    | 5              | 9,6             | 570 | -   | -              | 489            | -              | -              |
| NU1084-M1    | 3           | 92,9             | 420        | 620 | 90  | 5    | 5              | 9,6             | 570 | 470 | 551,5          | -              | -              | -              |
| NU1084-M1A   | 3           | 94,2             | 420        | 620 | 90  | 5    | 5              | 9,6             | 570 | 470 | 551,5          | -              | -              | -              |
| NU3084-M1    | 3           | 162              | 420        | 620 | 150 | 5    | 5              | 13,5            | 570 | 470 | 551,5          | -              | -              | -              |
| NU3084-M1A   | 3           | 162              | 420        | 620 | 150 | 5    | 5              | 13,5            | 570 | 470 | 551,5          | -              | -              | -              |
| NU3184-M1    | 3           | 352              | 420        | 700 | 224 | 6    | 6              | 19              | 645 | 485 | 619,5          | -              | -              | -              |
| NU1284-M1    | 3           | 314              | 420        | 760 | 150 | 7,5  | 7,5            | 9,8             | 694 | 494 | 662            | -              | -              | -              |
| NU2284-E-M1  | 3           | 398              | 420        | 760 | 195 | 7,5  | 7,5            | 16,8            | 690 | 494 | 658            | -              | -              | -              |
| NU2284-E-M1A | 3           | 406              | 420        | 760 | 195 | 7,5  | 7,5            | 16,8            | 690 | 494 | 658            | -              | -              | -              |
| Z-531636.ZL  | 2           | 19               | 440        | 540 | 40  | 2,1  | 2,1            | 6,5             | 514 | -   | -              | 478,6          | 3,2            | 9,5            |
| Z-527459.ZL  | 2           | 22               | 440        | 540 | 46  | 2,1  | 2,1            | 8,5             | 516 | -   | -              | 477,4          | 3,2            | 12,2           |
| N1888-M1B    | 1           | 22,3             | 440        | 540 | 46  | 2,1  | 2,1            | 5,3             | 516 | -   | -              | 476            | -              | -              |
| NU1888-M1    | 3           | 22,2             | 440        | 540 | 46  | 2,1  | 2,1            | 5,3             | 516 | 468 | 508            | -              | -              | -              |
| NU3888-M1    | 3           | 37               | 440        | 540 | 75  | 2,1  | 2,1            | 7,8             | 516 | 468 | 508            | -              | -              | -              |
| NU1988-M1    | 3           | 60,5             | 440        | 600 | 74  | 4    | 4              | 8,9             | 558 | 482 | 545,5          | -              | -              | -              |
| N2988-M1B    | 1           | 81               | 440        | 600 | 95  | 4    | 4              | 8,7             | 560 | -   | -              | 493,3          | -              | -              |
| NU2988-M1    | 3           | 81               | 440        | 600 | 95  | 4    | 4              | 8,7             | 560 | 480 | 545,6          | -              | -              | -              |
| NU3988-E-M1  | 3           | 99,2             | 440        | 600 | 118 | 4    | 4              | 9,7             | 564 | 480 | 550            | -              | -              | -              |
| N1088-M1     | 1           | 107              | 440        | 650 | 94  | 6    | 6              | 9,8             | 597 | -   | -              | 513,5          | -              | -              |
| NU1088-M1    | 3           | 107              | 440        | 650 | 94  | 6    | 6              | 9,8             | 597 | 493 | 577,6          | -              | -              | -              |
| NU1088-M1A   | 3           | 109              | 440        | 650 | 94  | 6    | 6              | 9,8             | 597 | 493 | 577,6          | -              | -              | -              |
| NU1088-MPA   | 3           | 113              | 440        | 650 | 94  | 6    | 6              | 9,8             | 597 | 493 | 577,6          | -              | -              | -              |
| NU3088-K-M1A | 3           | 181              | 440        | 650 | 157 | 6    | -              | 3,2             | 597 | 493 | 577,6          | -              | -              | -              |
| NU3188-M1    | 3           | 367              | 440        | 720 | 226 | 6    | 6              | 19,1            | 665 | 505 | 640            | -              | -              | -              |
| NU1288-M     | 3           | 345              | 440        | 790 | 155 | 7,5  | 7,5            | 9,8             | 724 | 514 | 690            | -              | -              | -              |
| NU2288-E-M1  | 3           | 438              | 440        | 790 | 200 | 7,5  | 7,5            | 17,5            | 718 | 518 | 686            | -              | -              | -              |
| NU2288-E-M1A | 3           | 449              | 440        | 790 | 200 | 7,5  | 7,5            | 17,5            | 718 | 518 | 686            | -              | -              | -              |
| Z-527460.ZL  | 2           | 32,1             | 460        | 580 | 56  | 3    | 3              | 10              | 550 | -   | -              | 505            | 3,2            | 12,2           |
| NU1892-M1    | 3           | 34,1             | 460        | 580 | 56  | 3    | 3              | 6,6             | 550 | 494 | 540,5          | -              | -              | -              |
| NU3892-M1    | 3           | 56,4             | 460        | 580 | 90  | 3    | 3              | 10              | 550 | 494 | 540,5          | -              | -              | -              |
| NU1992-M1    | 3           | 63,1             | 460        | 620 | 74  | 4    | 4              | 8,4             | 578 | 502 | 562,8          | -              | -              | -              |





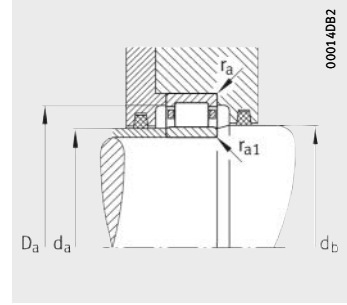
000140B4

1) Axial displacement "s" for N and NU



000140B3

Mounting dimensions for N



000140B2

Mounting dimensions for NU

Mounting dimensions

Basic load ratings

Fatigue limit load

Limiting speed

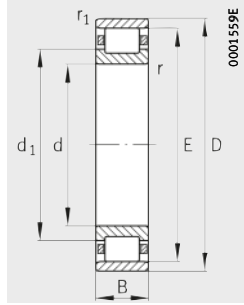
Reference speed

| d <sub>a</sub> |      | d <sub>b</sub> |      | D <sub>a</sub> | D <sub>b</sub> | D <sub>c</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub> | n <sub>G</sub>    | n <sub>B</sub>    |
|----------------|------|----------------|------|----------------|----------------|----------------|----------------|-----------------|---------------------|-----------------------|-----------------|-------------------|-------------------|
| min.           | max. | min.           | max. | min.           | max.           | min.           | max.           | max.            | kN                  | kN                    | kN              | min <sup>-1</sup> | min <sup>-1</sup> |
| 435            | 450  | 458            | 545  | –              | –              | –              | 3              | 3               | 1 370               | 2 900                 | 275             | 1 900             | 700               |
| 435            | 450  | 458            | 545  | –              | –              | –              | 3              | 3               | 1 760               | 3 900                 | 370             | 1 900             | 630               |
| 437            | –    | –              | 603  | 574            | 566            | –              | 4              | 4               | 1 400               | 2 450                 | 219             | 1 800             | 900               |
| 437            | 465  | 475            | 603  | –              | –              | –              | 4              | 4               | 1 400               | 2 450                 | 183             | 1 800             | 920               |
| 437            | 465  | 475            | 603  | –              | –              | –              | 4              | 4               | 1 400               | 2 450                 | 183             | 1 800             | 920               |
| 437            | 465  | 475            | 603  | –              | –              | –              | 4              | 4               | 2 700               | 5 600                 | 530             | 1 600             | 560               |
| 437            | 465  | 475            | 603  | –              | –              | –              | 4              | 4               | 2 700               | 5 600                 | 530             | 1 600             | 560               |
| 446            | 480  | 490            | 674  | –              | –              | –              | 5              | 5               | 4 900               | 8 800                 | 790             | 1 400             | 480               |
| 452            | 490  | 498            | 728  | –              | –              | –              | 6              | 6               | 3 900               | 5 700                 | 490             | 1 400             | 560               |
| 452            | 489  | 499            | 728  | –              | –              | –              | 6              | 6               | 5 000               | 8 150                 | 710             | 1 200             | 380               |
| 452            | 489  | 499            | 728  | –              | –              | –              | 6              | 6               | 5 000               | 8 150                 | 710             | 1 200             | 380               |
| 450            | –    | –              | 530  | 519            | 509            | –              | 2,1            | 2,1             | 290                 | 550                   | 37              | 2 200             | –                 |
| 450            | –    | –              | 530  | 521            | 511            | –              | 2,1            | 2,1             | 335                 | 620                   | 42              | 2 200             | –                 |
| 450            | –    | –              | 530  | 521            | 511            | –              | 2              | 2               | 540                 | 1 200                 | 104             | 2 200             | –                 |
| 450            | 464  | 471            | 530  | –              | –              | –              | 2              | 2               | 540                 | 1 200                 | 93              | 2 200             | –                 |
| 450            | 464  | 471            | 530  | –              | –              | –              | 2              | 2               | 965                 | 2 500                 | 232             | 2 000             | 670               |
| 455            | 478  | 486            | 585  | –              | –              | –              | 3              | 3               | 1 000               | 1 900                 | 149             | 1 900             | –                 |
| 455            | –    | –              | 585  | 565            | 555            | –              | 3              | 3               | 1 630               | 3 450                 | 320             | 1 800             | 670               |
| 455            | 476  | 484            | 585  | –              | –              | –              | 3              | 3               | 1 630               | 3 450                 | 320             | 1 800             | 670               |
| 455            | 476  | 484            | 585  | –              | –              | –              | 3              | 3               | 2 120               | 4 650                 | 430             | 1 600             | 560               |
| 463            | –    | –              | 627  | 601            | 593            | –              | 5              | 5               | 1 560               | 2 750                 | 244             | 1 600             | 850               |
| 463            | 488  | 498            | 627  | –              | –              | –              | 5              | 5               | 1 560               | 2 750                 | 203             | 1 600             | 860               |
| 463            | 488  | 498            | 627  | –              | –              | –              | 5              | 5               | 1 560               | 2 750                 | 203             | 1 600             | 860               |
| 463            | 488  | 498            | 627  | –              | –              | –              | 5              | 5               | 1 560               | 2 750                 | 203             | 1 600             | 860               |
| 463            | 488  | 498            | 627  | –              | –              | –              | 5              | –               | 3 000               | 6 400                 | 590             | 1 500             | 500               |
| 466            | 500  | 510            | 694  | –              | –              | –              | 5              | 5               | 5 100               | 9 300                 | 830             | 1 400             | 450               |
| 472            | 509  | 519            | 758  | –              | –              | –              | 6              | 6               | 4 050               | 6 000                 | 500             | 1 300             | 530               |
| 472            | 514  | 523            | 758  | –              | –              | –              | 6              | 6               | 5 100               | 8 300                 | 710             | 1 200             | 380               |
| 472            | 514  | 523            | 758  | –              | –              | –              | 6              | 6               | 5 100               | 8 300                 | 710             | 1 200             | 380               |
| 472            | –    | –              | 568  | 555            | 545            | –              | 2,5            | 2,5             | 400                 | 710                   | 48              | 2 000             | –                 |
| 472            | 490  | 497            | 568  | –              | –              | –              | 2,5            | 2,5             | 670                 | 1 430                 | 109             | 2 000             | –                 |
| 472            | 490  | 497            | 568  | –              | –              | –              | 2,5            | 2,5             | 1 200               | 3 050                 | 280             | 1 800             | 630               |
| 475            | 498  | 506            | 605  | –              | –              | –              | 3              | 3               | 1 020               | 1 960                 | 135             | 1 800             | –                 |

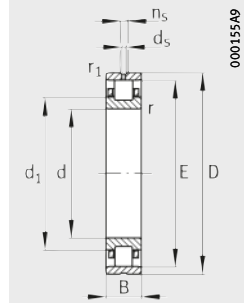


# Cylindrical roller bearings with cage

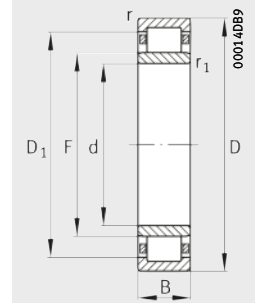
Single row  
Non-locating  
bearings



Design 1  
N



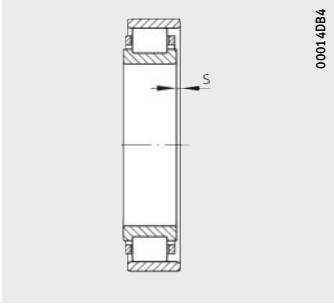
Design 2  
N with lubrication  
groove and holes



Design 3  
NU, cylindrical or  
tapered bore

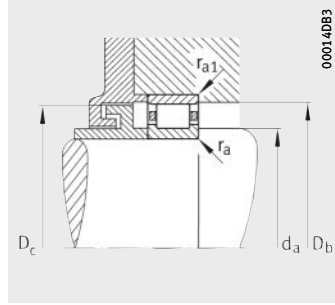
**Dimension table (continued)** · Dimensions in mm

| Designation         | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |     |     |     |                |                 |     |     |                |                |                |                |
|---------------------|-------------|------------------|------------|-----|-----|-----|----------------|-----------------|-----|-----|----------------|----------------|----------------|----------------|
|                     |             |                  | d          | D   | B   | r   | r <sub>1</sub> | s <sup>1)</sup> | E   | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| <b>NU2992-M1</b>    | 3           | 84               | <b>460</b> | 620 | 95  | 4   | 4              | 8,7             | 580 | 500 | 564            | –              | –              | –              |
| <b>NU3992-E-M1</b>  | 3           | 104              | <b>460</b> | 620 | 118 | 4   | 4              | 6,2             | 584 | 500 | 570            | –              | –              | –              |
| <b>NU1092-K-M1</b>  | 3           | 122              | <b>460</b> | 680 | 100 | 6   | –              | 11,2            | 624 | 516 | 603,9          | –              | –              | –              |
| <b>NU1092-K-M1A</b> | 3           | 124              | <b>460</b> | 680 | 100 | 6   | –              | 11,2            | 624 | 516 | 603,9          | –              | –              | –              |
| <b>NU1092-M1</b>    | 3           | 125              | <b>460</b> | 680 | 100 | 6   | 6              | 11,2            | 624 | 516 | 603,9          | –              | –              | –              |
| <b>NU1092-M1A</b>   | 3           | 126              | <b>460</b> | 680 | 100 | 6   | 6              | 11,2            | 624 | 516 | 603,9          | –              | –              | –              |
| <b>NU3092-K-M1A</b> | 3           | 206              | <b>460</b> | 680 | 163 | 6   | –              | 14,4            | 624 | 516 | 603,9          | –              | –              | –              |
| <b>NU3192-M1A</b>   | 3           | 436              | <b>460</b> | 760 | 240 | 7,5 | 7,5            | 20              | 701 | 531 | 674            | –              | –              | –              |
| <b>NU1292-M1</b>    | 3           | 401              | <b>460</b> | 830 | 165 | 7,5 | 7,5            | 14,1            | 759 | 539 | 724            | –              | –              | –              |
| <b>NU2292-E-M1</b>  | 3           | 511              | <b>460</b> | 830 | 212 | 7,5 | 7,5            | 20              | 756 | 544 | 722            | –              | –              | –              |
| <b>NU2292-E-M1A</b> | 3           | 521              | <b>460</b> | 830 | 212 | 7,5 | 7,5            | 20              | 756 | 544 | 722            | –              | –              | –              |
| <b>NU2292-E-MPA</b> | 3           | 513              | <b>460</b> | 830 | 212 | 7,5 | 7,5            | 20              | 756 | 544 | 722            | –              | –              | –              |
| <b>Z-527461.ZL</b>  | 2           | 34,6             | <b>480</b> | 600 | 56  | 3   | 3              | 10              | 570 | –   | –              | 525            | 3,2            | 12,2           |
| <b>NU1896-M1</b>    | 3           | 35,2             | <b>480</b> | 600 | 56  | 3   | 3              | 6,6             | 570 | 514 | 560,5          | –              | –              | –              |
| <b>NU3896-M1</b>    | 3           | 57,8             | <b>480</b> | 600 | 90  | 3   | 3              | 10              | 570 | 514 | 560,5          | –              | –              | –              |
| <b>NU1996-M1</b>    | 3           | 74,2             | <b>480</b> | 650 | 78  | 5   | 5              | 8,8             | 605 | 525 | 589            | –              | –              | –              |
| <b>NU2996-M1</b>    | 3           | 98,8             | <b>480</b> | 650 | 100 | 5   | 5              | 6,3             | 607 | 523 | 593            | –              | –              | –              |
| <b>NU3996-E-M1</b>  | 3           | 125              | <b>480</b> | 650 | 128 | 5   | 5              | 6,7             | 613 | 523 | 598            | –              | –              | –              |
| <b>N1096-M1</b>     | 1           | 128              | <b>480</b> | 700 | 100 | 6   | 6              | 10,7            | 644 | –   | –              | 556,4          | –              | –              |
| <b>NU1096-M1</b>    | 3           | 129              | <b>480</b> | 700 | 100 | 6   | 6              | 10,7            | 644 | 536 | 623,9          | –              | –              | –              |
| <b>NU1096-M1A</b>   | 3           | 132              | <b>480</b> | 700 | 100 | 6   | 6              | 10,7            | 644 | 536 | 623,9          | –              | –              | –              |
| <b>NU3096-M1</b>    | 3           | 219              | <b>480</b> | 700 | 165 | 6   | 6              | 15              | 644 | 536 | 623,9          | –              | –              | –              |
| <b>NU3196-M1</b>    | 3           | 483              | <b>480</b> | 790 | 248 | 7,5 | 7,5            | 22              | 726 | 556 | 698,8          | –              | –              | –              |
| <b>NU1296-M1</b>    | 3           | 468              | <b>480</b> | 870 | 170 | 7,5 | 7,5            | 10,5            | 794 | 564 | 757            | –              | –              | –              |
| <b>Z-537024.ZL</b>  | 2           | 29,6             | <b>500</b> | 620 | 45  | 3   | 3              | 7               | 587 | –   | –              | 547            | 3,2            | 9,5            |
| <b>Z-527462.ZL</b>  | 2           | 35               | <b>500</b> | 620 | 56  | 3   | 3              | 10              | 590 | –   | –              | 545            | 3,2            | 12,2           |
| <b>N18/500-M1</b>   | 1           | 36,1             | <b>500</b> | 620 | 56  | 3   | 3              | 6,6             | 590 | –   | –              | 543,5          | –              | –              |
| <b>NU18/500-M1</b>  | 3           | 36,9             | <b>500</b> | 620 | 56  | 3   | 3              | 6,6             | 590 | 534 | 580            | –              | –              | –              |
| <b>N28/500-M1</b>   | 1           | 48,2             | <b>500</b> | 620 | 72  | 3   | 3              | 8               | 590 | –   | –              | 543,5          | –              | –              |
| <b>NU28/500-M1</b>  | 3           | 48,5             | <b>500</b> | 620 | 72  | 3   | 3              | 8               | 590 | 534 | 580            | –              | –              | –              |
| <b>NU28/500-M1A</b> | 3           | 49,1             | <b>500</b> | 620 | 72  | 3   | 3              | 8               | 590 | 534 | 580            | –              | –              | –              |
| <b>NU38/500-M1</b>  | 3           | 60,5             | <b>500</b> | 620 | 90  | 3   | 3              | 10              | 590 | 534 | 580            | –              | –              | –              |
| <b>NU19/500-M1</b>  | 3           | 76,8             | <b>500</b> | 670 | 78  | 5   | 5              | 8,8             | 625 | 545 | 609            | –              | –              | –              |



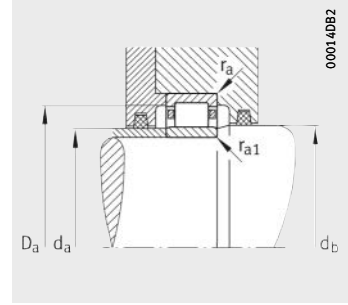
000140B4

1) Axial displacement "s" for N and NU



000140B3

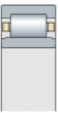
Mounting dimensions for N



000140B2

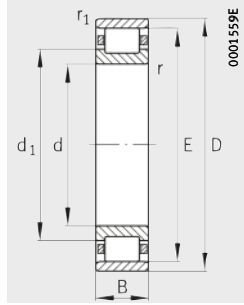
Mounting dimensions for NU

| Mounting dimensions |      |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$               |      | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
| min.                | max. |       |       |       |       |       |          |                     |                         |                                      |  |   |
| 475                 | 496  | 504   | 605   | –     | –     | 3     | 3        | 1 660               | 3 600                   | 330                                  | 1 600  | 630   |
| 475                 | 496  | 504   | 605   | –     | –     | 3     | 3        | 2 160               | 4 800                   | 440                                  | 1 600  | 530   |
| 483                 | 510  | 522   | 657   | –     | –     | 5     | –        | 1 660               | 3 000                   | 218                                  | 1 600  | 800   |
| 483                 | 510  | 522   | 657   | –     | –     | 5     | –        | 1 660               | 3 000                   | 218                                  | 1 600  | 800   |
| 483                 | 510  | 522   | 657   | –     | –     | 5     | 5        | 1 660               | 3 000                   | 218                                  | 1 600  | 830   |
| 483                 | 510  | 522   | 657   | –     | –     | 5     | 5        | 1 660               | 3 000                   | 218                                  | 1 600  | 830   |
| 483                 | 511  | 521   | 657   | –     | –     | 5     | –        | 3 250               | 6 950                   | 630                                  | 1 400  | 480   |
| 492                 | 526  | 536   | 728   | –     | –     | 6     | 6        | 5 600               | 10 400                  | 920                                  | 1 300  | 430   |
| 492                 | 534  | 544   | 798   | –     | –     | 6     | 6        | 4 650               | 6 950                   | 580                                  | 1 200  | 500   |
| 492                 | 540  | 549   | 798   | –     | –     | 6     | 6        | 5 600               | 9 150                   | 770                                  | 1 100  | 360   |
| 492                 | 540  | 549   | 798   | –     | –     | 6     | 6        | 5 600               | 9 150                   | 770                                  | 1 100  | 355   |
| 492                 | 540  | 549   | 798   | –     | –     | 6     | 6        | 5 600               | 9 150                   | 770                                  | 1 100  | 360   |
| 492                 | –    | –     | 588   | 575   | 565   | 2,5   | 2,5      | 415                 | 765                     | 52                                   | 1 900  | –   |
| 492                 | 510  | 517   | 588   | –     | –     | 2,5   | 2,5      | 680                 | 1 460                   | 113                                  | 1 900  | –   |
| 492                 | 510  | 517   | 588   | –     | –     | 2,5   | 2,5      | 1 220               | 3 100                   | 285                                  | 1 800  | 600   |
| 497                 | 521  | 529   | 633   | –     | –     | 4     | 4        | 1 140               | 2 240                   | 172                                  | 1 800  | –   |
| 497                 | 519  | 527   | 633   | –     | –     | 4     | 4        | 1 900               | 4 150                   | 380                                  | 1 500  | 560   |
| 497                 | 519  | 527   | 633   | –     | –     | 4     | 4        | 2 450               | 5 500                   | 495                                  | 1 500  | 500   |
| 503                 | –    | –     | 677   | 648,5 | 639,5 | 5     | 5        | 1 700               | 3 100                   | 270                                  | 1 500  | 800   |
| 503                 | 530  | 542   | 677   | –     | –     | 5     | 5        | 1 700               | 3 100                   | 225                                  | 1 500  | 780   |
| 503                 | 530  | 542   | 677   | –     | –     | 5     | 5        | 1 700               | 3 100                   | 225                                  | 1 500  | 780   |
| 503                 | 531  | 541   | 677   | –     | –     | 5     | 5        | 3 350               | 7 200                   | 650                                  | 1 400  | 450   |
| 512                 | 551  | 561   | 758   | –     | –     | 6     | 6        | 5 850               | 11 000                  | 970                                  | 1 200  | 400   |
| 512                 | 559  | 569   | 838   | –     | –     | 6     | 6        | 5 100               | 7 650                   | 630                                  | 1 100  | 450   |
| 512                 | –    | –     | 608   | 593   | 581   | 2,5   | 2,5      | 360                 | 695                     | 47                                   | 1 900  | –   |
| 512                 | –    | –     | 608   | 596   | 584   | 2,5   | 2,5      | 440                 | 830                     | 55                                   | 1 800  | –   |
| 512                 | –    | –     | 608   | 596   | 584   | 2,5   | 2,5      | 695                 | 1 530                   | 130                                  | 1 800  | –   |
| 512                 | 530  | 538   | 608   | –     | –     | 2,5   | 2,5      | 695                 | 1 530                   | 116                                  | 1 800  | –   |
| 512                 | –    | –     | 608   | 596   | 584   | 2,5   | 2,5      | 1 020               | 2 500                   | 222                                  | 1 600  | 630   |
| 512                 | 530  | 538   | 608   | –     | –     | 2,5   | 2,5      | 1 020               | 2 500                   | 222                                  | 1 600  | 630   |
| 512                 | 530  | 538   | 608   | –     | –     | 2,5   | 2,5      | 1 020               | 2 500                   | 222                                  | 1 600  | 630   |
| 512                 | 530  | 538   | 608   | –     | –     | 2,5   | 2,5      | 1 250               | 3 250                   | 290                                  | 1 600  | 560   |
| 517                 | 541  | 549   | 653   | –     | –     | 4     | 4        | 1 160               | 2 320                   | 176                                  | 1 600  | –   |

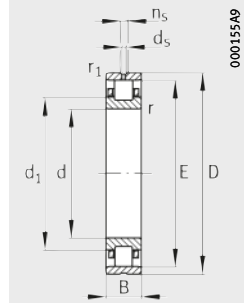


# Cylindrical roller bearings with cage

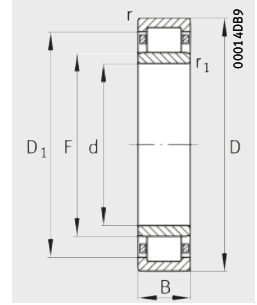
Single row  
Non-locating  
bearings



Design 1  
N



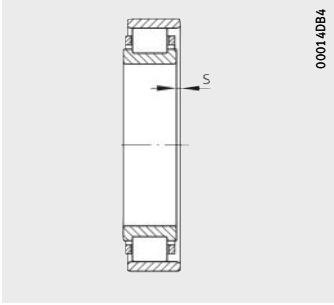
Design 2  
N with lubrication  
groove and holes



Design 3  
NU, cylindrical or  
tapered bore

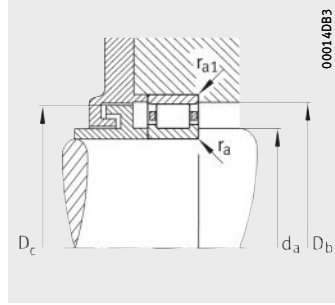
**Dimension table (continued)** · Dimensions in mm

| Designation    | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                 |     |     |                |                |                |                |
|----------------|-------------|------------------|------------|-----|-----|------|----------------|-----------------|-----|-----|----------------|----------------|----------------|----------------|
|                |             |                  | d          | D   | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E   | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|                |             |                  |            |     |     | min. | min.           |                 |     |     | ≈              | ≈              |                |                |
| NU29/500-M1    | 3           | 103              | 500        | 670 | 100 | 5    | 5              | 6,3             | 627 | 543 | 613            | –              | –              | –              |
| NU39/500-E-M1  | 3           | 128              | 500        | 670 | 128 | 5    | 5              | 11              | 633 | 543 | 618            | –              | –              | –              |
| N10/500-M1     | 1           | 132              | 500        | 720 | 100 | 6    | 6              | 10,7            | 664 | –   | –              | 576,4          | –              | –              |
| NU10/500-M1    | 3           | 133              | 500        | 720 | 100 | 6    | 6              | 10,7            | 664 | 556 | 643,9          | –              | –              | –              |
| NU10/500-M1A   | 3           | 135              | 500        | 720 | 100 | 6    | 6              | 10,7            | 664 | 556 | 643,9          | –              | –              | –              |
| NU20/500-E-M1  | 3           | 177              | 500        | 720 | 128 | 6    | 6              | 7               | 673 | 553 | 655,5          | –              | –              | –              |
| NU30/500-M1    | 3           | 230              | 500        | 720 | 167 | 6    | 6              | 10,8            | 664 | 556 | 643,9          | –              | –              | –              |
| NU31/500-M1    | 3           | 575              | 500        | 830 | 264 | 7,5  | 7,5            | 23,5            | 761 | 581 | 732            | –              | –              | –              |
| NU12/500-M1    | 3           | 568              | 500        | 920 | 185 | 7,5  | 7,5            | 16              | 839 | 589 | 799            | –              | –              | –              |
| NU12/500-M1A   | 3           | 568              | 500        | 920 | 185 | 7,5  | 7,5            | 16              | 839 | 589 | 799            | –              | –              | –              |
| NU22/500-E-M1  | 3           | 728              | 500        | 920 | 243 | 7,5  | 7,5            | 17              | 824 | 604 | 789            | –              | –              | –              |
| Z-527247.ZL    | 2           | 31               | 530        | 650 | 45  | 3    | 3              | 3,2             | 620 | –   | –              | 575            | 3,2            | 9,5            |
| Z-527272.ZL    | 2           | 36,6             | 530        | 650 | 56  | 3    | 3              | 10              | 620 | –   | –              | 573,5          | 3,2            | 12,2           |
| NU18/530-M1    | 3           | 38,5             | 530        | 650 | 56  | 3    | 3              | 6,6             | 620 | 564 | 610,5          | –              | –              | –              |
| NU28/530-M1    | 3           | 50,7             | 530        | 650 | 72  | 3    | 3              | 8               | 620 | 564 | 610,5          | –              | –              | –              |
| NU38/530-M1    | 3           | 64,1             | 530        | 650 | 90  | 3    | 3              | 10              | 620 | 564 | 610,5          | –              | –              | –              |
| NU19/530-M1    | 3           | 89,9             | 530        | 710 | 82  | 5    | 5              | 9,3             | 662 | 578 | 645,2          | –              | –              | –              |
| NU29/530-M1    | 3           | 123              | 530        | 710 | 106 | 5    | 5              | 8,5             | 665 | 575 | 647            | –              | –              | –              |
| NU10/530-M1    | 3           | 190              | 530        | 780 | 112 | 6    | 6              | 10,2            | 719 | 591 | 696            | –              | –              | –              |
| NU10/530-M1A   | 3           | 193              | 530        | 780 | 112 | 6    | 6              | 10,2            | 719 | 591 | 696            | –              | –              | –              |
| NU20/530-E-M1  | 3           | 250              | 530        | 780 | 145 | 6    | 6              | 8               | 724 | 594 | 703,1          | –              | –              | –              |
| NU30/530-K-M1A | 3           | 311              | 530        | 780 | 185 | 6    | –              | 16,8            | 719 | 591 | 696            | –              | –              | –              |
| NU30/530-M1A   | 3           | 315              | 530        | 780 | 185 | 6    | 6              | 15,5            | 719 | 591 | 696            | –              | –              | –              |
| NU31/530-M1    | 3           | 665              | 530        | 870 | 272 | 7,5  | 7,5            | 22              | 801 | 611 | 770,6          | –              | –              | –              |
| NU12/530-M1    | 3           | 702              | 530        | 980 | 200 | 9,5  | 9,5            | 11,7            | 894 | 624 | 851            | –              | –              | –              |
| Z-540208.ZL    | 2           | 33               | 560        | 680 | 45  | 3    | 3              | 7               | 647 | –   | –              | 606,8          | 3,2            | 9,5            |
| Z-526722.ZL    | 2           | 40,5             | 560        | 680 | 56  | 3    | 3              | 10              | 650 | –   | –              | 605            | 3,2            | 9,5            |
| NU18/560-M1    | 3           | 40,5             | 560        | 680 | 56  | 3    | 3              | 6,6             | 650 | 594 | 640            | –              | –              | –              |
| NU38/560-M1    | 3           | 67,3             | 560        | 680 | 90  | 3    | 3              | 10              | 650 | 594 | 640            | –              | –              | –              |
| NU19/560-M1    | 3           | 105              | 560        | 750 | 85  | 5    | 5              | 9,6             | 700 | 610 | 682            | –              | –              | –              |
| NU29/560-M1    | 3           | 143              | 560        | 750 | 112 | 5    | 5              | 6,5             | 703 | 607 | 687,5          | –              | –              | –              |
| NU10/560-K-M1  | 3           | 209              | 560        | 820 | 115 | 6    | –              | 9,8             | 754 | 626 | 731            | –              | –              | –              |
| NU10/560-M1    | 3           | 213              | 560        | 820 | 115 | 6    | 6              | 9,8             | 754 | 626 | 731            | –              | –              | –              |



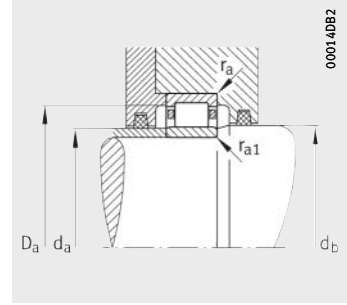
000140B4

1) Axial displacement "s"  
for N and NU



000140B3

Mounting dimensions  
for N



000140B2

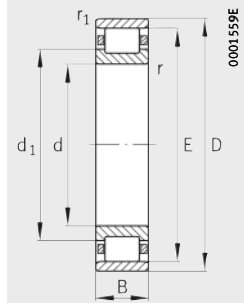
Mounting dimensions  
for NU

| Mounting dimensions |      |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$               |      | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
| min.                | max. | min.  | max.  | min.  | max.  | max.  | max.     |                     |                         |                                      |  |   |
| 517                 | 539  | 547   | 653   | –     | –     | 4     | 4        | 1 930               | 4 300                   | 385                                  | 1 500  | 560   |
| 517                 | 539  | 547   | 653   | –     | –     | 4     | 4        | 2 500               | 5 700                   | 510                                  | 1 400  | 480   |
| 523                 | –    | –     | 697   | 669   | 659   | 5     | 5        | 1 760               | 3 200                   | 275                                  | 1 500  | 750   |
| 523                 | 550  | 562   | 697   | –     | –     | 5     | 5        | 1 760               | 3 200                   | 232                                  | 1 500  | 750   |
| 523                 | 550  | 562   | 697   | –     | –     | 5     | 5        | 1 760               | 3 200                   | 232                                  | 1 500  | 750   |
| 523                 | 548  | 558   | 697   | –     | –     | 5     | 5        | 3 000               | 6 000                   | 530                                  | 1 400  | 480   |
| 523                 | 551  | 561   | 697   | –     | –     | 5     | 5        | 3 400               | 7 500                   | 670                                  | 1 400  | 430   |
| 532                 | 576  | 586   | 798   | –     | –     | 6     | 6        | 6 550               | 12 500                  | 1 070                                | 1 100  | 360   |
| 532                 | 584  | 594   | 888   | –     | –     | 6     | 6        | 5 700               | 8 500                   | 680                                  | 1 100  | 430   |
| 532                 | 584  | 594   | 888   | –     | –     | 6     | 6        | 5 700               | 8 500                   | 680                                  | 1 100  | 430   |
| 532                 | 600  | 608   | 888   | –     | –     | 6     | 6        | 7 100               | 12 500                  | 1 030                                | 1 000  | 290   |
| 542                 | –    | –     | 638   | 626   | 614   | 2,5   | 2,5      | 455                 | 880                     | 58                                   | 1 800  | –   |
| 542                 | –    | –     | 638   | 626   | 614   | 2,5   | 2,5      | 455                 | 880                     | 58                                   | 1 800  | –   |
| 542                 | 560  | 568   | 638   | –     | –     | 2,5   | 2,5      | 720                 | 1 660                   | 123                                  | 1 800  | –   |
| 542                 | 560  | 568   | 638   | –     | –     | 2,5   | 2,5      | 1 060               | 2 700                   | 236                                  | 1 500  | 600   |
| 542                 | 560  | 568   | 638   | –     | –     | 2,5   | 2,5      | 1 290               | 3 450                   | 310                                  | 1 500  | 530   |
| 547                 | 574  | 582   | 693   | –     | –     | 4     | 4        | 1 290               | 2 650                   | 197                                  | 1 500  | –   |
| 547                 | 571  | 579   | 693   | –     | –     | 4     | 4        | 2 200               | 4 900                   | 425                                  | 1 400  | 500   |
| 553                 | 585  | 597   | 757   | –     | –     | 5     | 5        | 2 500               | 4 550                   | 320                                  | 1 300  | 640   |
| 553                 | 585  | 597   | 757   | –     | –     | 5     | 5        | 2 500               | 4 550                   | 320                                  | 1 300  | 640   |
| 553                 | 589  | 599   | 757   | –     | –     | 5     | 5        | 3 550               | 7 200                   | 610                                  | 1 300  | 450   |
| 553                 | 586  | 596   | 757   | –     | –     | 5     | –        | 4 300               | 9 150                   | 810                                  | 1 300  | 380   |
| 553                 | 586  | 596   | 757   | –     | –     | 5     | 5        | 4 300               | 9 150                   | 810                                  | 1 300  | 380   |
| 562                 | 605  | 616   | 838   | –     | –     | 6     | 6        | 7 200               | 14 000                  | 1 180                                | 1 100  | 320   |
| 570                 | 619  | 629   | 940   | –     | –     | 8     | 8        | 6 300               | 9 300                   | 730                                  | 1 000  | 400   |
| 572                 | –    | –     | 668   | 653   | 641   | 2,5   | 2,5      | 375                 | 750                     | 48,5                                 | 1 600  | –   |
| 572                 | –    | –     | 668   | 656   | 644   | 2,5   | 2,5      | 475                 | 950                     | 61                                   | 1 600  | –   |
| 572                 | 590  | 598   | 668   | –     | –     | 2,5   | 2,5      | 735                 | 1 700                   | 124                                  | 1 600  | –   |
| 572                 | 590  | 598   | 668   | –     | –     | 2,5   | 2,5      | 1 290               | 3 550                   | 310                                  | 1 500  | 500   |
| 577                 | 606  | 614   | 733   | –     | –     | 4     | 4        | 1 460               | 3 000                   | 215                                  | 1 400  | –   |
| 577                 | 603  | 611   | 733   | –     | –     | 4     | 4        | 2 450               | 5 500                   | 475                                  | 1 400  | 450   |
| 583                 | 620  | 632   | 797   | –     | –     | 5     | –        | 2 700               | 5 100                   | 355                                  | 1 200  | 590   |
| 583                 | 620  | 632   | 797   | –     | –     | 5     | 5        | 2 700               | 5 100                   | 355                                  | 1 200  | 590   |

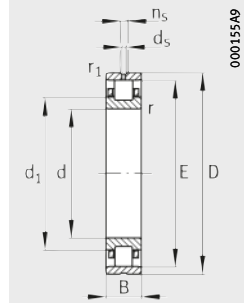


# Cylindrical roller bearings with cage

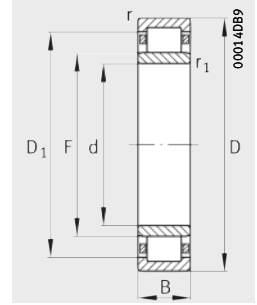
Single row  
Non-locating  
bearings



Design 1  
N



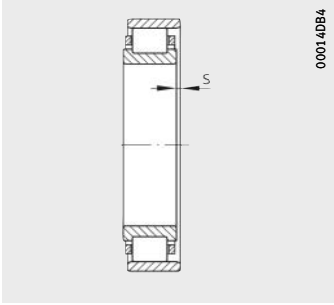
Design 2  
N with lubrication  
groove and holes



Design 3  
NU

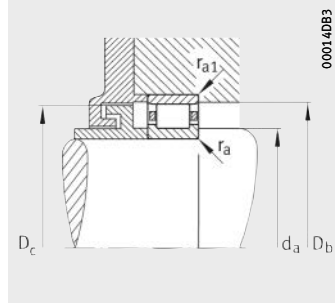
Dimension table (continued) · Dimensions in mm

| Designation     | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |      |     |     |                |                 |       |     |                |                |                |                |
|-----------------|-------------|------------------|------------|------|-----|-----|----------------|-----------------|-------|-----|----------------|----------------|----------------|----------------|
|                 |             |                  | d          | D    | B   | r   | r <sub>1</sub> | s <sup>1)</sup> | E     | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| NU10/560-M1A    | 3           | 222              | 560        | 820  | 115 | 6   | 6              | 9,8             | 754   | 626 | 731            | –              | –              | –              |
| NU20/560-E-M1   | 3           | 281              | 560        | 820  | 150 | 6   | 6              | 12              | 762   | 626 | 741            | –              | –              | –              |
| NU30/560-M1     | 3           | 362              | 560        | 820  | 195 | 6   | 6              | 16,8            | 754   | 626 | 731            | –              | –              | –              |
| NU31/560-M1     | 3           | 756              | 560        | 920  | 280 | 7,5 | 7,5            | 22,5            | 846   | 646 | 814            | –              | –              | –              |
| NU12/560-M1     | 3           | 778              | 560        | 1030 | 206 | 9,5 | 9,5            | 11,9            | 939   | 659 | 894            | –              | –              | –              |
| NU12/560-M1A    | 3           | 778              | 560        | 1030 | 206 | 9,5 | 9,5            | 11,9            | 939   | 659 | 894            | –              | –              | –              |
| NU22/560-E-M    | 3           | 1040             | 560        | 1030 | 272 | 9,5 | 9,5            | 21,9            | 939   | 659 | 894            | –              | –              | –              |
| NU22/560-E-M1A  | 3           | 1070             | 560        | 1030 | 272 | 9,5 | 9,5            | 21,9            | 939   | 659 | 894            | –              | –              | –              |
| Z-503867.ZL     | 3           | 64,6             | 585        | 750  | 60  | 3   | 3              | –               | 693   | 637 | 682,4          | –              | –              | –              |
| Z-527273.ZL     | 2           | 52,3             | 600        | 730  | 60  | 3   | 3              | 12,2            | 697   | –   | –              | 658,4          | 3,2            | 12,2           |
| N18/600-M1      | 1           | 50,4             | 600        | 730  | 60  | 3   | 3              | 7               | 697   | –   | –              | 647            | –              | –              |
| NU18/600-M1     | 3           | 50,6             | 600        | 730  | 60  | 3   | 3              | 7               | 697   | 637 | 687            | –              | –              | –              |
| NU28/600-M1     | 3           | 67,4             | 600        | 730  | 78  | 3   | 3              | 9,5             | 697   | 637 | 687            | –              | –              | –              |
| NU38/600-M1     | 3           | 85,1             | 600        | 730  | 98  | 3   | 3              | 11              | 697   | 637 | 687            | –              | –              | –              |
| NU19/600-M1     | 3           | 125              | 600        | 800  | 90  | 5   | 5              | 9,9             | 748   | 652 | 730,7          | –              | –              | –              |
| NU29/600-E-M1   | 3           | 172              | 600        | 800  | 118 | 5   | 5              | 8,4             | 757   | 649 | 739            | –              | –              | –              |
| NU29/600-E-M1A  | 3           | 172              | 600        | 800  | 118 | 5   | 5              | 8,4             | 757   | 649 | 739            | –              | –              | –              |
| NU29/600-E-MP1A | 3           | 169              | 600        | 800  | 118 | 5   | 5              | 8,4             | 757   | 649 | 739            | –              | –              | –              |
| N10/600-M1      | 1           | 240              | 600        | 870  | 118 | 6   | 6              | 10,6            | 803   | –   | –              | 693,5          | –              | –              |
| N10/600-M1B     | 1           | 241              | 600        | 870  | 118 | 6   | 6              | 10,6            | 803   | –   | –              | 693,5          | –              | –              |
| NU10/600-M1     | 3           | 241              | 600        | 870  | 118 | 6   | 6              | 10,6            | 803   | 667 | 776            | –              | –              | –              |
| NU10/600-M1A    | 3           | 243              | 600        | 870  | 118 | 6   | 6              | 10,6            | 803   | 667 | 776            | –              | –              | –              |
| NU30/600-MP1A   | 3           | 400              | 600        | 870  | 200 | 6   | 6              | 16              | 803   | 667 | 776            | –              | –              | –              |
| NU31/600-M1     | 3           | 898              | 600        | 980  | 300 | 7,5 | 7,5            | 25,5            | 902   | 692 | 868,5          | –              | –              | –              |
| NU12/600-M1     | 3           | 918              | 600        | 1090 | 212 | 9,5 | 9,5            | 12              | 994   | 704 | 947,5          | –              | –              | –              |
| Z-547406.ZL     | 1           | 116              | 622        | 775  | 108 | 5   | 5              | –               | 743,5 | –   | –              | 670,5          | –              | –              |
| Z-537025.ZL     | 2           | 58,1             | 630        | 780  | 56  | 4   | 4              | 9               | 737   | –   | –              | 688,5          | 3,2            | 12,2           |
| Z-527274.ZL     | 2           | 68,6             | 630        | 780  | 69  | 4   | 4              | 12,5            | 744   | –   | –              | 686            | 3,2            | 12,2           |
| NU18/630-M1     | 3           | 71,8             | 630        | 780  | 69  | 4   | 4              | 8,4             | 744   | 672 | 732            | –              | –              | –              |
| N28/630-M1      | 1           | 94,5             | 630        | 780  | 88  | 4   | 4              | 8,7             | 744   | –   | –              | 684            | –              | –              |
| NU28/630-M1     | 3           | 94,8             | 630        | 780  | 88  | 4   | 4              | 8,7             | 744   | 672 | 732            | –              | –              | –              |
| NU28/630-M1A    | 3           | 96,5             | 630        | 780  | 88  | 4   | 4              | 8,7             | 744   | 672 | 732            | –              | –              | –              |
| NU38/630-M1     | 3           | 118              | 630        | 780  | 112 | 4   | 4              | 11,2            | 744   | 672 | 732            | –              | –              | –              |
| NU19/630-M1     | 3           | 163              | 630        | 850  | 100 | 6   | 6              | 8,5             | 792   | 688 | 771            | –              | –              | –              |
| NU29/630-E-M1   | 3           | 211              | 630        | 850  | 128 | 6   | 6              | 10,3            | 803   | 683 | 784            | –              | –              | –              |



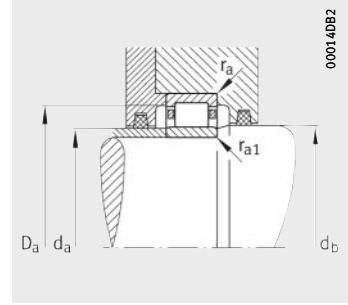
000140B4

1) Axial displacement "s"  
for N and NU



000140B3

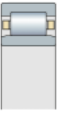
Mounting dimensions  
for N



000140B2

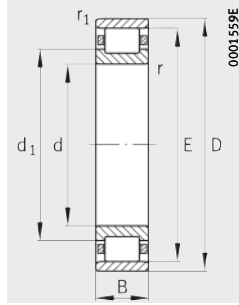
Mounting dimensions  
for NU

| Mounting dimensions |       |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|---|---|--|
| $d_a$               |       | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |   |   |  |
| min.                | max.  | min.  | max.  | min.  | max.  | max.  | max.     |                     |                         |   |   |  |
| 583                 | 620   | 632   | 797   | –     | –     | 5     | 5        | 2 700               | 5 100                   | 355                                     | 1 200   | 590  |
| 583                 | 620,5 | 631,5 | 797   | –     | –     | 5     | 5        | 3 900               | 7 800                   | 660                                     | 1 200   | 400  |
| 583                 | 621   | 631   | 797   | –     | –     | 5     | 5        | 4 500               | 10 000                  | 860                                     | 1 200   | 360  |
| 592                 | 641   | 646   | 888   | –     | –     | 6     | 6        | 8 000               | 15 300                  | 1 280                                   | 1 000   | 300  |
| 600                 | 654   | 664   | 990   | –     | –     | 8     | 8        | 7 100               | 10 800                  | 830                                     | 950   | 360  |
| 600                 | 654   | 664   | 990   | –     | –     | 8     | 8        | 7 100               | 10 800                  | 830                                     | 950   | 360  |
| 600                 | 654   | 664   | 990   | –     | –     | 8     | 8        | 9 500               | 15 600                  | 1 240                                   | 850   | 240  |
| 600                 | 654   | 664   | 990   | –     | –     | 8     | 8        | 9 500               | 15 600                  | 1 240                                   | 850   | 240  |
| 597                 | 632   | 642   | 738   | –     | –     | 2,5   | 2,5      | 750                 | 1 800                   | 135                                     | 1 500   | 530  |
| 612                 | –     | –     | 718   | 703   | 691   | 2,5   | 2,5      | 405                 | 900                     | 55                                      | 1 500   | 670  |
| 612                 | –     | –     | 718   | 703   | 691   | 2,5   | 2,5      | 850                 | 2 000                   | 162                                     | 1 500   | –  |
| 612                 | 632   | 642   | 718   | –     | –     | 2,5   | 2,5      | 850                 | 2 000                   | 144                                     | 1 500   | –  |
| 612                 | 632   | 642   | 718   | –     | –     | 2,5   | 2,5      | 1 250               | 3 350                   | 280                                     | 1 400   | 500  |
| 612                 | 632   | 642   | 718   | –     | –     | 2,5   | 2,5      | 1 530               | 4 250                   | 365                                     | 1 400   | 450  |
| 617                 | 647   | 657   | 783   | –     | –     | 4     | 4        | 1 700               | 3 450                   | 249                                     | 1 400   | –  |
| 617                 | 645   | 655   | 783   | –     | –     | 4     | 4        | 3 000               | 6 700                   | 570                                     | 1 200   | 400  |
| 617                 | 645   | 655   | 783   | –     | –     | 4     | 4        | 3 000               | 6 700                   | 570                                     | 1 200   | 400  |
| 617                 | 645   | 655   | 783   | –     | –     | 4     | 4        | 3 000               | 6 700                   | 570                                     | 1 200   | 400  |
| 623                 | –     | –     | 847   | 809   | 797   | 5     | 5        | 2 850               | 5 400                   | 440                                     | 1 100   | 530  |
| 623                 | –     | –     | 847   | 809   | 797   | 5     | 5        | 2 850               | 5 400                   | 440                                     | 1 100   | 530  |
| 623                 | 661   | 673   | 847   | –     | –     | 5     | 5        | 2 850               | 5 400                   | 365                                     | 1 100   | 550  |
| 623                 | 661   | 673   | 847   | –     | –     | 5     | 5        | 2 850               | 5 400                   | 365                                     | 1 100   | 550  |
| 623                 | 642   | 672   | 847   | –     | –     | 5     | 5        | 4 900               | 11 000                  | 920                                     | 1 100   | 320  |
| 632                 | 687   | 697   | 948   | –     | –     | 6     | 6        | 8 650               | 17 000                  | 1 390                                   | 950   | 280  |
| 640                 | 704   | 714   | 1 050 | –     | –     | 8     | 8        | 7 800               | 12 500                  | 940                                     | 900   | 320  |
| 637                 | –     | –     | 760   | 750   | 738   | 4     | 4        | 2 400               | 5 700                   | 425                                     | 1 300   | 380  |
| 645                 | –     | –     | 765   | 743   | 730   | 3     | 3        | 530                 | 1 100                   | 68                                      | 1 400   | –  |
| 645                 | –     | –     | 765   | 750   | 738   | 3     | 3        | 655                 | 1 250                   | 80                                      | 1 400   | –  |
| 645                 | 667   | 677   | 765   | –     | –     | 3     | 3        | 1 140               | 2 600                   | 189                                     | 1 400   | –  |
| 645                 | –     | –     | 765   | 751   | 737   | 3     | 3        | 1 700               | 4 400                   | 370                                     | 1 300   | 430  |
| 645                 | 667   | 677   | 765   | –     | –     | 3     | 3        | 1 700               | 4 400                   | 370                                     | 1 300   | 430  |
| 645                 | 667   | 677   | 765   | –     | –     | 3     | 3        | 1 700               | 4 400                   | 370                                     | 1 300   | 430  |
| 645                 | 667   | 677   | 765   | –     | –     | 3     | 3        | 2 040               | 5 500                   | 470                                     | 1 300   | 400  |
| 653                 | 683   | 693   | 827   | –     | –     | 5     | 5        | 1 900               | 3 900                   | 280                                     | 1 300   | –  |
| 653                 | 678   | 688   | 827   | –     | –     | 5     | 5        | 3 350               | 7 350                   | 505                                     | 1 100   | 360  |

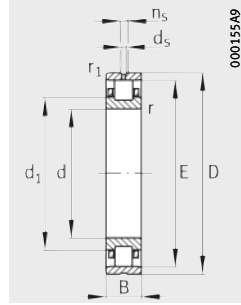


# Cylindrical roller bearings with cage

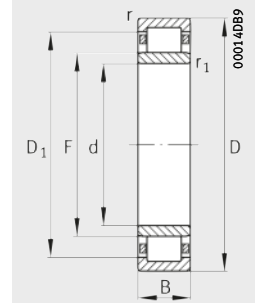
Single row  
Non-locating  
bearings



Design 1  
N



Design 2  
N with lubrication  
groove and holes

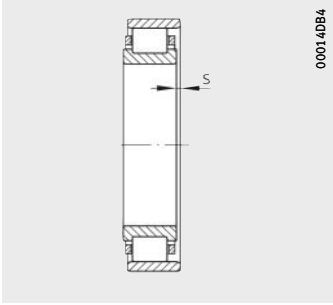


Design 3  
NU

Dimension table (continued) · Dimensions in mm

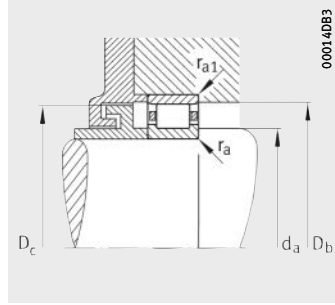
| Designation  | De-<br>sign | Mass<br>m<br>≈kg | Dimensions |      |     |      |                |                 |      |     |                |                |                |                |
|--------------|-------------|------------------|------------|------|-----|------|----------------|-----------------|------|-----|----------------|----------------|----------------|----------------|
|              |             |                  | d          | D    | B   | r    | r <sub>1</sub> | s <sup>1)</sup> | E    | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|              |             |                  |            |      |     | min. | min.           |                 |      |     | ≈              | ≈              |                |                |
| N10/630-M1   | 1           | 292              | 630        | 920  | 128 | 7,5  | 7,5            | 11,7            | 850  | —   | —              | 728            | —              | —              |
| NU30/630-M1  | 3           | 486              | 630        | 920  | 212 | 7,5  | 7,5            | 17,4            | 850  | 700 | 826,2          | —              | —              | —              |
| NU31/630-M   | 3           | 1050             | 630        | 1030 | 315 | 7,5  | 7,5            | 27,3            | 947  | 727 | 911,8          | —              | —              | —              |
| NU12/630-M1  | 3           | 1100             | 630        | 1150 | 230 | 15   | 15             | 20              | 1020 | 760 | 978            | —              | —              | —              |
| Z-527249.ZL  | 2           | 60,1             | 640        | 790  | 56  | 4    | 4              | 8,5             | 750  | —   | —              | 698,3          | 3,2            | 12,2           |
| Z-537238.ZL  | 2           | 60,7             | 670        | 820  | 56  | 4    | 4              | 9               | 778  | —   | —              | 729,5          | 6,3            | 12,2           |
| Z-527463.ZL  | 2           | 70,3             | 670        | 820  | 69  | 4    | 4              | 12,5            | 784  | —   | —              | 725,9          | 3,2            | 12,2           |
| NU18/670-M1  | 3           | 75,9             | 670        | 820  | 69  | 4    | 4              | 7,8             | 784  | 712 | 772            | —              | —              | —              |
| N28/670-M1   | 1           | 100              | 670        | 820  | 88  | 4    | 4              | 8,7             | 784  | —   | —              | 724            | —              | —              |
| NU28/670-M1  | 3           | 100              | 670        | 820  | 88  | 4    | 4              | 8,7             | 784  | 712 | 772            | —              | —              | —              |
| NU28/670-M1A | 3           | 101              | 670        | 820  | 88  | 4    | 4              | 8,7             | 784  | 712 | 772            | —              | —              | —              |
| NU38/670-M1  | 3           | 123              | 670        | 820  | 112 | 4    | 4              | 11,2            | 784  | 712 | 772            | —              | —              | —              |
| NU19/670-M1  | 3           | 186              | 670        | 900  | 103 | 6    | 6              | 11,3            | 839  | 731 | 817            | —              | —              | —              |
| NU29/670-M1  | 3           | 257              | 670        | 900  | 136 | 6    | 6              | 7,5             | 841  | 729 | 819            | —              | —              | —              |
| N10/670-M1   | 1           | 348              | 670        | 980  | 136 | 7,5  | 7,5            | 12,7            | 905  | —   | —              | 774,5          | —              | —              |
| NU30/670-M1  | 3           | 620              | 670        | 980  | 230 | 7,5  | 7,5            | 20,6            | 905  | 745 | 876,2          | —              | —              | —              |
| NU12/670-M   | 3           | 1300             | 670        | 1220 | 243 | 12   | 12             | 13,4            | 1115 | 785 | 1062           | —              | —              | —              |
| Z-527275.ZL  | 2           | 86,8             | 710        | 870  | 74  | 4    | 4              | 12              | 833  | —   | —              | 768,4          | 3,2            | 12,2           |
| N18/710-M1   | 1           | 91,5             | 710        | 870  | 74  | 4    | 4              | 7,9             | 833  | —   | —              | 766,5          | —              | —              |
| NU18/710-M1  | 3           | 91,7             | 710        | 870  | 74  | 4    | 4              | 7,9             | 833  | 753 | 820            | —              | —              | —              |
| NU19/710-M1  | 3           | 213              | 710        | 950  | 106 | 6    | 6              | 9,3             | 886  | 774 | 867,7          | —              | —              | —              |
| NU29/710-M1  | 3           | 289              | 710        | 950  | 140 | 6    | 6              | 11,7            | 890  | 770 | 866            | —              | —              | —              |
| NU29/710-M1A | 3           | 289              | 710        | 950  | 140 | 6    | 6              | 11,7            | 890  | 770 | 866            | —              | —              | —              |
| N10/710-M1   | 1           | 401              | 710        | 1030 | 140 | 7,5  | 7,5            | 12,6            | 950  | —   | —              | 819,5          | —              | —              |
| NU10/710-M1  | 3           | 400              | 710        | 1030 | 140 | 7,5  | 7,5            | 12,6            | 950  | 790 | 924,5          | —              | —              | —              |
| NU10/710-M1A | 3           | 406              | 710        | 1030 | 140 | 7,5  | 7,5            | 12,6            | 950  | 790 | 924,5          | —              | —              | —              |
| NU30/710-M1  | 3           | 673              | 710        | 1030 | 236 | 7,5  | 7,5            | 22,3            | 950  | 790 | 924,5          | —              | —              | —              |
| Z-527250.ZL  | 2           | 79               | 720        | 880  | 62  | 4    | 4              | 9               | 839  | —   | —              | 780,9          | 3,2            | 12,2           |
| Z-536020.ZL  | 2           | 95               | 750        | 920  | 68  | 5    | 5              | 12              | 875  | —   | —              | 817            | 3,2            | 12,2           |
| Z-526719.ZL  | 2           | 106              | 750        | 920  | 78  | 5    | 5              | 15              | 879  | —   | —              | 812,2          | 3,2            | 12,2           |
| NU18/750-M1  | 3           | 108              | 750        | 920  | 78  | 5    | 5              | 8,8             | 879  | 799 | 866            | —              | —              | —              |
| NU38/750-M1  | 3           | 182              | 750        | 920  | 128 | 5    | 5              | 14              | 879  | 799 | 866            | —              | —              | —              |
| NU19/750-M1  | 3           | 245              | 750        | 1000 | 112 | 6    | 6              | 12,1            | 935  | 815 | 911            | —              | —              | —              |
| NU29/750-M1  | 3           | 329              | 750        | 1000 | 145 | 6    | 6              | 8               | 940  | 810 | 919            | —              | —              | —              |
| N10/750-M1   | 1           | 481              | 750        | 1090 | 150 | 7,5  | 7,5            | 13,6            | 1005 | —   | —              | 866            | —              | —              |





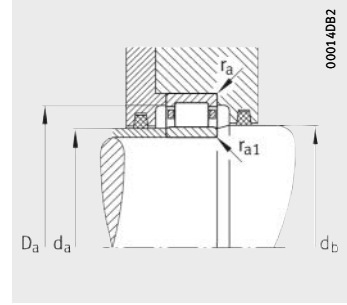
000140B4

1) Axial displacement "s"  
for N and NU



000140B3

Mounting dimensions  
for N



000140B2

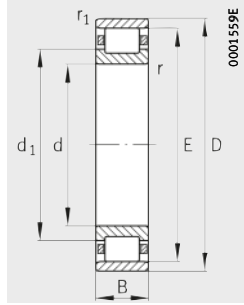
Mounting dimensions  
for NU

| Mounting dimensions |      |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|---|---|--|
| $d_a$               |      | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |   |   |  |
| min.                | max. |       |       |       |       |       |          |                     |                         |   |   |  |
| 658                 | –    | –     | 892   | 856   | 844   | 6     | 6        | 3 250               | 6 200                   | 495                                     | 1 100   | 500  |
| 658                 | 695  | 705   | 892   | –     | –     | 6     | 6        | 5 700               | 12 500                  | 1 030                                   | 1 100   | 300  |
| 662                 | 722  | 732   | 998   | –     | –     | 6     | 6        | 9 150               | 18 000                  | 1 430                                   | 900   | 260  |
| 684                 | 740  | 745   | 1 096 | –     | –     | 12    | 12       | 7 800               | 13 200                  | 1 000                                   | 800   | 300  |
| 655                 | –    | –     | 775   | 756   | 744   | 3     | 3        | 610                 | 1 250                   | 78                                      | 1 400   | –  |
| 685                 | –    | –     | 805   | 784   | 772   | 3     | 3        | 530                 | 1 100                   | 67                                      | 1 400   | –  |
| 685                 | –    | –     | 805   | 790   | 778   | 3     | 3        | 680                 | 1 370                   | 85                                      | 1 400   | –  |
| 685                 | 707  | 717   | 805   | –     | –     | 3     | 3        | 1 180               | 2 750                   | 197                                     | 1 400   | –  |
| 685                 | –    | –     | 805   | 791   | 777   | 3     | 3        | 1 760               | 4 650                   | 385                                     | 1 200   | 400  |
| 685                 | 707  | 717   | 805   | –     | –     | 3     | 3        | 1 760               | 4 650                   | 385                                     | 1 200   | 400  |
| 685                 | 707  | 717   | 805   | –     | –     | 3     | 3        | 1 760               | 4 650                   | 385                                     | 1 200   | 400  |
| 685                 | 707  | 717   | 805   | –     | –     | 3     | 3        | 2 120               | 5 850                   | 320                                     | 1 200   | 360  |
| 693                 | 726  | 736   | 877   | –     | –     | 5     | 5        | 2 040               | 4 250                   | 300                                     | 1 200   | –  |
| 693                 | 724  | 734   | 877   | –     | –     | 5     | 5        | 3 450               | 8 150                   | 690                                     | 1 100   | 340  |
| 698                 | –    | –     | 952   | 911   | 899   | 6     | 6        | 3 750               | 7 100                   | 540                                     | 950   | 450  |
| 698                 | 740  | 750   | 952   | –     | –     | 6     | 6        | 6 550               | 14 600                  | 1 180                                   | 950   | 260  |
| 718                 | 780  | 790   | 1 172 | –     | –     | 10    | 10       | 9 150               | 14 300                  | 1 050                                   | 800   | 280  |
| 725                 | –    | –     | 855   | 840   | 826   | 3     | 3        | 800                 | 1 560                   | 124                                     | 1 200   | –  |
| 725                 | –    | –     | 855   | 840   | 826   | 3     | 3        | 1 400               | 3 250                   | 260                                     | 1 200   | –  |
| 725                 | 748  | 758   | 855   | –     | –     | 3     | 3        | 1 400               | 3 250                   | 230                                     | 1 200   | –  |
| 733                 | 769  | 779   | 927   | –     | –     | 5     | 5        | 2 240               | 4 750                   | 300                                     | 1 100   | –  |
| 733                 | 765  | 775   | 927   | –     | –     | 5     | 5        | 3 750               | 8 800                   | 710                                     | 1 000   | 320  |
| 733                 | 765  | 775   | 927   | –     | –     | 5     | 5        | 3 750               | 8 800                   | 710                                     | 1 000   | 320  |
| 738                 | –    | –     | 1 002 | 957   | 943   | 6     | 6        | 4 050               | 8 000                   | 620                                     | 950   | 430  |
| 738                 | 784  | 796   | 1 002 | –     | –     | 6     | 6        | 4 050               | 8 000                   | 510                                     | 950   | 425  |
| 738                 | 784  | 796   | 1 002 | –     | –     | 6     | 6        | 4 050               | 8 000                   | 510                                     | 950   | 425  |
| 738                 | 785  | 795   | 1 002 | –     | –     | 6     | 6        | 6 800               | 15 600                  | 1 250                                   | 950   | 240  |
| 735                 | –    | –     | 865   | 846   | 832   | 3     | 3        | 800                 | 1 700                   | 104                                     | 1 200   | –  |
| 767                 | –    | –     | 903   | 882   | 868   | 4     | 4        | 735                 | 1 560                   | 94                                      | 1 100   | –  |
| 767                 | –    | –     | 903   | 886   | 872   | 4     | 4        | 850                 | 1 700                   | 102                                     | 1 100   | –  |
| 767                 | 794  | 804   | 903   | –     | –     | 4     | 4        | 1 430               | 3 450                   | 213                                     | 1 100   | –  |
| 767                 | 794  | 804   | 903   | –     | –     | 4     | 4        | 2 550               | 7 350                   | 590                                     | 1 100   | 320  |
| 773                 | 810  | 820   | 977   | –     | –     | 5     | 5        | 2 500               | 5 300                   | 365                                     | 1 100   | –  |
| 773                 | 805  | 815   | 977   | –     | –     | 5     | 5        | 4 150               | 9 650                   | 770                                     | 950   | 300  |
| 778                 | –    | –     | 1 062 | 1 012 | 998   | 6     | 6        | 4 500               | 9 000                   | 680                                     | 850   | 400  |

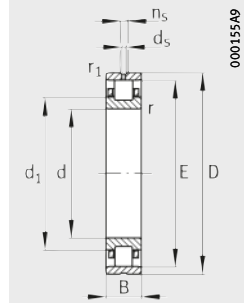


# Cylindrical roller bearings with cage

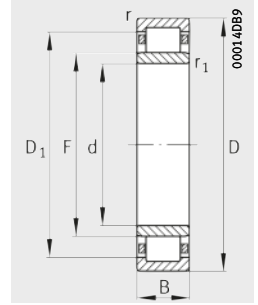
Single row  
Non-locating  
bearings



Design 1  
N



Design 2  
N with lubrication  
groove and holes

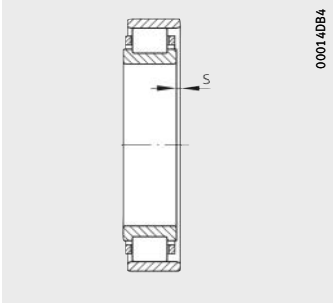


Design 3  
NU

Dimension table (continued) · Dimensions in mm

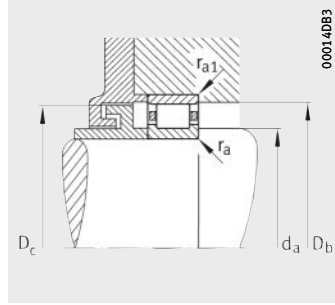
| Designation  | De-<br>sign     | Mass<br>m<br>≈kg | Dimensions |      |     |     |                |                 |      |     |                |                |                |                |
|--------------|-----------------|------------------|------------|------|-----|-----|----------------|-----------------|------|-----|----------------|----------------|----------------|----------------|
|              |                 |                  | d          | D    | B   | r   | r <sub>1</sub> | s <sup>2)</sup> | E    | F   | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| NU10/750-M1  | 3               | 480              | <b>750</b> | 1090 | 150 | 7,5 | 7,5            | 13,6            | 1005 | 835 | 978            | –              | –              | –              |
| NU10/750-M1A | 3               | 495              | <b>750</b> | 1090 | 150 | 7,5 | 7,5            | 13,6            | 1005 | 835 | 978            | –              | –              | –              |
| NU30/750-M1  | 3               | 808              | <b>750</b> | 1090 | 250 | 7,5 | 7,5            | 20,5            | 1005 | 835 | 978            | –              | –              | –              |
| Z-527276.ZL  | 2 <sup>1)</sup> | 113              | <b>800</b> | 980  | 82  | 5   | 5              | 15              | 939  | –   | –              | 866,2          | 3,2            | 12,2           |
| NU18/800-M1  | 3               | 129              | <b>800</b> | 980  | 82  | 5   | 5              | 8,9             | 939  | 849 | 923            | –              | –              | –              |
| NU38/800-M1  | 3               | 220              | <b>800</b> | 980  | 136 | 5   | 5              | 14              | 939  | 849 | 923            | –              | –              | –              |
| NU19/800-M1  | 3               | 276              | <b>800</b> | 1060 | 115 | 6   | 6              | 12,8            | 990  | 870 | 968,4          | –              | –              | –              |
| NU29/800-M1  | 3               | 378              | <b>800</b> | 1060 | 150 | 6   | 6              | 13,3            | 995  | 865 | 969            | –              | –              | –              |
| N10/800-M1   | 1               | 556              | <b>800</b> | 1150 | 155 | 7,5 | 7,5            | 13,6            | 1065 | –   | –              | 918            | –              | –              |
| NU10/800-M1  | 3               | 557              | <b>800</b> | 1150 | 155 | 7,5 | 7,5            | 13,6            | 1065 | 885 | 1036           | –              | –              | –              |
| NU10/800-M1A | 3               | 557              | <b>800</b> | 1150 | 155 | 7,5 | 7,5            | 13,6            | 1065 | 885 | 1036           | –              | –              | –              |
| NU30/800-M1  | 3               | 912              | <b>800</b> | 1150 | 258 | 7,5 | 7,5            | 22,5            | 1065 | 885 | 1036           | –              | –              | –              |
| Z-527251.ZL  | 2               | 101              | <b>820</b> | 990  | 72  | 5   | 5              | 7,3             | 951  | –   | –              | 883,2          | 3,2            | 12,2           |
| Z-526720.ZL  | 2 <sup>1)</sup> | 130              | <b>850</b> | 1030 | 82  | 5   | 5              | 15              | 989  | –   | –              | 916,2          | 3,2            | 15             |
| NU18/850-M1  | 3               | 137              | <b>850</b> | 1030 | 82  | 5   | 5              | 9               | 985  | 895 | 970            | –              | –              | –              |
| NU28/650-M1  | 3               | 185              | <b>850</b> | 1030 | 106 | 5   | 5              | 9,3             | 985  | 895 | 970            | –              | –              | –              |
| NU38/650-M1A | 3               | 186              | <b>850</b> | 1030 | 106 | 5   | 5              | 9,3             | 985  | 895 | 970            | –              | –              | –              |
| NU38/850-M1  | 3               | 232              | <b>850</b> | 1030 | 136 | 5   | 5              | 14              | 985  | 895 | 970            | –              | –              | –              |
| NU19/850-M1  | 3               | 315              | <b>850</b> | 1120 | 118 | 6   | 6              | 12,6            | 1049 | 921 | 1024,1         | –              | –              | –              |
| NU29/850-M1  | 3               | 427              | <b>850</b> | 1120 | 155 | 6   | 6              | 8,6             | 1053 | 917 | 1031,5         | –              | –              | –              |
| N10/850-M1   | 1               | 658              | <b>850</b> | 1220 | 165 | 7,5 | 7,5            | 13,5            | 1125 | –   | –              | 978            | –              | –              |
| NU10/850-M1  | 3               | 659              | <b>850</b> | 1220 | 165 | 7,5 | 7,5            | 13,5            | 1125 | 945 | 1096,2         | –              | –              | –              |
| NU30/850-M   | 3               | 1080             | <b>850</b> | 1220 | 272 | 7,5 | 7,5            | 26              | 1125 | 945 | 1096,2         | –              | –              | –              |
| Z-527464.ZL  | 2 <sup>1)</sup> | 146              | <b>900</b> | 1090 | 85  | 5   | 5              | 15              | 1047 | –   | –              | 969,3          | 3,2            | 15             |
| NU18/900-M1  | 3               | 159              | <b>900</b> | 1090 | 85  | 5   | 5              | 11,8            | 1047 | 951 | 1031           | –              | –              | –              |
| NU38/900-M1  | 3               | 269              | <b>900</b> | 1090 | 140 | 5   | 5              | 13,5            | 1047 | 951 | 1031           | –              | –              | –              |
| NU19/900-M1  | 3               | 354              | <b>900</b> | 1180 | 122 | 6   | 6              | 9,8             | 1108 | 972 | 1086,2         | –              | –              | –              |
| NU29/900-M1  | 3               | 499              | <b>900</b> | 1180 | 165 | 6   | 6              | 13,3            | 1110 | 970 | 1088           | –              | –              | –              |
| N10/900-M1   | 1               | 720              | <b>900</b> | 1280 | 170 | 7,5 | 7,5            | 13,5            | 1190 | –   | –              | 1026           | –              | –              |
| NU10/900-M1  | 3               | 728              | <b>900</b> | 1280 | 170 | 7,5 | 7,5            | 13,5            | 1190 | 990 | 1158           | –              | –              | –              |
| NU30/900-M1  | 3               | 1190             | <b>900</b> | 1280 | 280 | 7,5 | 7,5            | 23              | 1190 | 990 | 1158           | –              | –              | –              |

<sup>1)</sup> With thread M8 for eye bolts on the end faces.



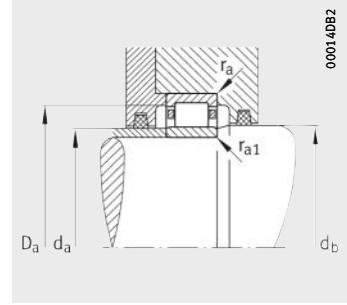
000140B4

2) Axial displacement "s" for N and NU



000140B3

Mounting dimensions for N



000140B2

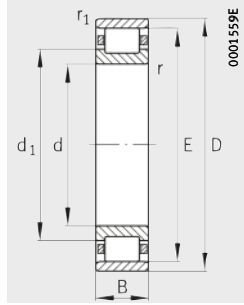
Mounting dimensions for NU

| Mounting dimensions |      |                |                |                |                |                |                 | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ur</sub><br>kN | Limiting speed<br>n <sub>G</sub><br>min <sup>-1</sup> | Reference speed<br>n <sub>B</sub><br>min <sup>-1</sup> |
|---------------------|------|----------------|----------------|----------------|----------------|----------------|-----------------|------------------------------|--------------------------------|---|---|--|
| d <sub>a</sub>      |      | d <sub>b</sub> | D <sub>a</sub> | D <sub>B</sub> | D <sub>C</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |   |   |  |
| min.                | max. |                |                |                |                |                |                 |                              |                                |   |   |  |
| 778                 | 829  | 841            | 1062           | -              | -              | 6              | 6               | 4 500                        | 9 000                          | 570   | 850   | 400  |
| 778                 | 829  | 841            | 1062           | -              | -              | 6              | 6               | 4 500                        | 9 000                          | 570   | 850   | 400  |
| 778                 | 830  | 840            | 1062           | -              | -              | 6              | 6               | 7 650                        | 17 600                         | 1 380                                       | 850   | 220  |
| 817                 | -    | -              | 963            | 946            | 932            | 4              | 4               | 1 020                        | 2 000                          | 118   | 1 100   | 450  |
| 817                 | 844  | 854            | 963            | -              | -              | 4              | 4               | 1 760                        | 4 150                          | 280   | 1 100   | -  |
| 817                 | 844  | 854            | 963            | -              | -              | 4              | 4               | 3 100                        | 8 800                          | 690   | 1 000   | 280  |
| 823                 | 865  | 875            | 1037           | -              | -              | 5              | 5               | 2 600                        | 5 700                          | 390   | 1 000   | -  |
| 823                 | 860  | 870            | 1037           | -              | -              | 5              | 5               | 4 250                        | 10 000                         | 780   | 900   | 280  |
| 828                 | -    | -              | 1122           | 1072           | 1058           | 6              | 6               | 5 000                        | 10 000                         | 750   | 800   | 360  |
| 828                 | 879  | 891            | 1122           | -              | -              | 6              | 6               | 5 000                        | 10 000                         | 630   | 800   | 365  |
| 828                 | 879  | 891            | 1122           | -              | -              | 6              | 6               | 5 000                        | 10 000                         | 630   | 800   | 365  |
| 828                 | 880  | 890            | 1122           | -              | -              | 6              | 6               | 8 500                        | 19 600                         | 1 530                                       | 800   | 200  |
| 837                 | -    | -              | 973            | 858            | 844            | 4              | 4               | 915                          | 1 900                          | 111   | 1 100   | -  |
| 867                 | -    | -              | 1013           | 896            | 882            | 4              | 4               | 1 060                        | 2 160                          | 126   | 1 000   | -  |
| 867                 | 894  | 904            | 1013           | -              | -              | 4              | 4               | 1 800                        | 4 400                          | 295   | 1 000   | -  |
| 867                 | 890  | 900            | 1013           | -              | -              | 4              | 4               | 2 750                        | 7 650                          | 590   | 950   | 280  |
| 867                 | 890  | 900            | 1013           | -              | -              | 4              | 4               | 2 750                        | 7 650                          | 590   | 950   | 280  |
| 867                 | 894  | 904            | 1013           | -              | -              | 4              | 4               | 3 200                        | 9 300                          | 720   | 950   | 260  |
| 873                 | 916  | 926            | 1097           | -              | -              | 5              | 5               | 2 900                        | 6 400                          | 430   | 950   | -  |
| 873                 | 912  | 922            | 1097           | -              | -              | 5              | 5               | 4 750                        | 11 600                         | 890   | 850   | 260  |
| 878                 | -    | -              | 1192           | 1 132          | 1 118          | 6              | 6               | 5 600                        | 11 800                         | 880   | 750   | 320  |
| 878                 | 938  | 952            | 1192           | -              | -              | 6              | 6               | 5 600                        | 11 800                         | 730   | 750   | 325  |
| 878                 | 940  | 950            | 1192           | -              | -              | 6              | 6               | 8 500                        | 20 400                         | 1 540                                       | 750   | 190  |
| 917                 | -    | -              | 1073           | 1054           | 1040           | 4              | 4               | 1 140                        | 2 320                          | 132   | 950   | -  |
| 917                 | 946  | 956            | 1073           | -              | -              | 4              | 4               | 2 040                        | 5 100                          | 330   | 950   | -  |
| 917                 | 946  | 956            | 1073           | -              | -              | 4              | 4               | 3 600                        | 10 600                         | 810   | 850   | 220  |
| 923                 | 967  | 977            | 1157           | -              | -              | 5              | 5               | 3 250                        | 7 350                          | 470   | 900   | -  |
| 923                 | 965  | 975            | 1157           | -              | -              | 5              | 5               | 5 400                        | 13 400                         | 1 010                                       | 800   | 220  |
| 928                 | -    | -              | 1252           | 1 198          | 1 182          | 6              | 6               | 6 400                        | 13 400                         | 960   | 700   | 300  |
| 928                 | 983  | 997            | 1252           | -              | -              | 6              | 6               | 6 400                        | 13 400                         | 800   | 700   | 295  |
| 928                 | 985  | 995            | 1252           | -              | -              | 6              | 6               | 10 200                       | 24 000                         | 1 770                                       | 700   | 170  |

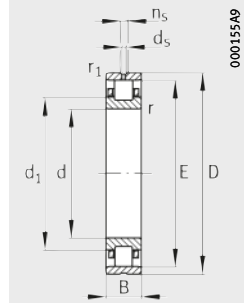


# Cylindrical roller bearings with cage

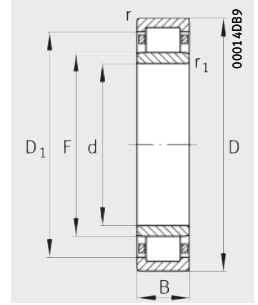
Single row  
Non-locating  
bearings



Design 1  
N



Design 2  
N with lubrication  
groove and holes

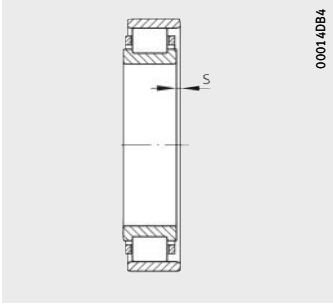


Design 3  
NU

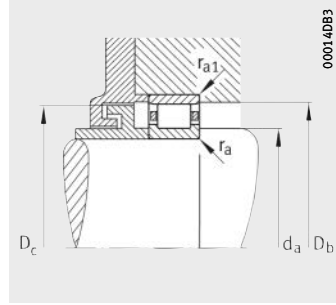
Dimension table (continued) · Dimensions in mm

| Designation           | De-<br>sign     | Mass<br>m<br>≈kg | Dimensions  |      |     |     |                |                 |       |       |                |                |                |                |
|-----------------------|-----------------|------------------|-------------|------|-----|-----|----------------|-----------------|-------|-------|----------------|----------------|----------------|----------------|
|                       |                 |                  | d           | D    | B   | r   | r <sub>1</sub> | s <sup>2)</sup> | E     | F     | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| <b>F-803618.ZL</b>    | 2 <sup>1)</sup> | 185              | <b>950</b>  | 1150 | 90  | 5   | 5              | 20,5            | 1094  | –     | –              | 1 029,4        | 3,2            | 15             |
| <b>Z-527465.ZL</b>    | 2 <sup>1)</sup> | 171              | <b>950</b>  | 1150 | 90  | 5   | 5              | 15,5            | 1104  | –     | –              | 1 024          | 3,2            | 15             |
| <b>NU18/950-M1</b>    | 3               | 187              | <b>950</b>  | 1150 | 90  | 5   | 5              | 9,5             | 1104  | 1004  | 1088           | –              | –              | –              |
| <b>NU38/950-M1</b>    | 3               | 318              | <b>950</b>  | 1150 | 150 | 5   | 5              | 15              | 1104  | 1004  | 1088           | –              | –              | –              |
| <b>NU19/950-M1</b>    | 3               | 435              | <b>950</b>  | 1250 | 132 | 7,5 | 7,5            | 13,9            | 1175  | 1025  | 1151           | –              | –              | –              |
| <b>NU29/950-M1</b>    | 3               | 596              | <b>950</b>  | 1250 | 175 | 7,5 | 7,5            | 14,5            | 1175  | 1025  | 1151           | –              | –              | –              |
| <b>N10/950-M1</b>     | 1               | 898              | <b>950</b>  | 1360 | 180 | 7,5 | 7,5            | 13,5            | 1255  | –     | –              | 1 091          | –              | –              |
| <b>NU10/950-M1</b>    | 3               | 899              | <b>950</b>  | 1360 | 180 | 7,5 | 7,5            | 13,5            | 1255  | 1055  | 1223           | –              | –              | –              |
| <b>NU30/950-M</b>     | 3               | 1 490            | <b>950</b>  | 1360 | 300 | 7,5 | 7,5            | 28              | 1255  | 1055  | 1223           | –              | –              | –              |
| <b>NU31/950-M</b>     | 3               | 3 080            | <b>950</b>  | 1500 | 438 | 12  | 12             | –               | 1 361 | 1 089 | 1 317          | –              | –              | –              |
| <b>Z-527466.ZL</b>    | 2 <sup>1)</sup> | 198              | <b>1000</b> | 1210 | 92  | 6   | 6              | 16              | 1155  | –     | –              | 1 075          | 4,8            | 15             |
| <b>NU18/1000-M1</b>   | 3               | 242              | <b>1000</b> | 1220 | 100 | 6   | 6              | 10,3            | 1170  | 1058  | 1150           | –              | –              | –              |
| <b>NU28/1000-M</b>    | 3               | 324              | <b>1000</b> | 1220 | 128 | 6   | 6              | 11              | 1170  | 1058  | 1150           | –              | –              | –              |
| <b>NU28/1000-MA</b>   | 3               | 326              | <b>1000</b> | 1220 | 128 | 6   | 6              | 11              | 1170  | 1058  | 1150           | –              | –              | –              |
| <b>NU38/1000-M</b>    | 3               | 411              | <b>1000</b> | 1220 | 165 | 6   | 6              | 16,3            | 1170  | 1058  | 1150           | –              | –              | –              |
| <b>Z-507276.ZL</b>    | 3               | 423              | <b>1000</b> | 1290 | 130 | 7,5 | 7,5            | 11,3            | 1215  | 1075  | 1187           | –              | –              | –              |
| <b>NU19/1000-M1</b>   | 3               | 527              | <b>1000</b> | 1320 | 140 | 7,5 | 7,5            | 10,5            | 1240  | 1080  | 1214,4         | –              | –              | –              |
| <b>NU29/1000-M1</b>   | 3               | 708              | <b>1000</b> | 1320 | 185 | 7,5 | 7,5            | 16,3            | 1240  | 1080  | 1215           | –              | –              | –              |
| <b>N10/1000-M1</b>    | 1               | 1 010            | <b>1000</b> | 1420 | 185 | 7,5 | 7,5            | 14,5            | 1 315 | –     | –              | 1 143          | –              | –              |
| <b>NU10/1000-M1</b>   | 3               | 1 010            | <b>1000</b> | 1420 | 185 | 7,5 | 7,5            | 14,5            | 1 315 | 1 105 | 1 281          | –              | –              | –              |
| <b>NU20/1000-E-M1</b> | 3               | 1 300            | <b>1000</b> | 1420 | 243 | 7,5 | 7,5            | 11,5            | 1 330 | 1 100 | 1 293          | –              | –              | –              |
| <b>NU30/1000-M1</b>   | 3               | 1 640            | <b>1000</b> | 1420 | 308 | 7,5 | 7,5            | 28              | 1 315 | 1 105 | 1 281          | –              | –              | –              |
| <b>Z-539392.ZL</b>    | 2               | 203              | <b>1030</b> | 1240 | 92  | 6   | 6              | 15              | 1185  | –     | –              | 1 104          | 4,8            | 15             |
| <b>Z-539393.ZL</b>    | 2               | 257              | <b>1030</b> | 1250 | 100 | 6   | 6              | –               | 1 190 | –     | –              | 1 109          | –              | –              |
| <b>Z-526747.ZL</b>    | 2 <sup>1)</sup> | 211              | <b>1060</b> | 1270 | 92  | 6   | 6              | 16              | 1215  | –     | –              | 1 134          | 4,8            | 9,5            |
| <b>Z-535549.ZL</b>    | 2               | 240              | <b>1060</b> | 1280 | 100 | 6   | 6              | 12,5            | 1220  | –     | –              | 1 139          | 4,8            | 9,5            |
| <b>NU18/1060-M1</b>   | 3               | 259              | <b>1060</b> | 1280 | 100 | 6   | 6              | 10,3            | 1230  | 1118  | 1210           | –              | –              | –              |
| <b>NU28/1060-M</b>    | 3               | 341              | <b>1060</b> | 1280 | 128 | 6   | 6              | 11              | 1230  | 1118  | 1210           | –              | –              | –              |
| <b>NU38/1060-M</b>    | 3               | 431              | <b>1060</b> | 1280 | 165 | 6   | 6              | 16,3            | 1230  | 1118  | 1210           | –              | –              | –              |
| <b>NU19/1060-M1</b>   | 3               | 630              | <b>1060</b> | 1400 | 150 | 7,5 | 7,5            | 11,5            | 1312  | 1148  | 1285,8         | –              | –              | –              |
| <b>NU29/1060-M1</b>   | 3               | 830              | <b>1060</b> | 1400 | 195 | 7,5 | 7,5            | 16,2            | 1315  | 1145  | 1288           | –              | –              | –              |
| <b>N10/1060-M1</b>    | 1               | 1 150            | <b>1060</b> | 1500 | 195 | 9,5 | 9,5            | 14,5            | 1390  | –     | –              | 1 210          | –              | –              |
| <b>NU10/1060-M1</b>   | 3               | 1 150            | <b>1060</b> | 1500 | 195 | 9,5 | 9,5            | 14,5            | 1390  | 1 170 | 1 355          | –              | –              | –              |

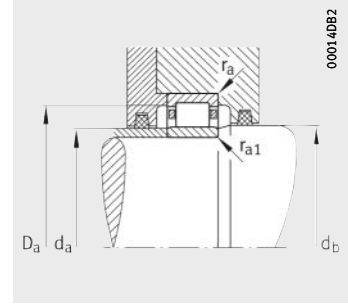
<sup>1)</sup> With thread M8 for eye bolts on the end faces.



2) Axial displacement "s"  
for N and NU



Mounting dimensions  
for N



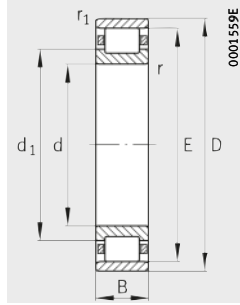
Mounting dimensions  
for NU

| Mounting dimensions |      |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|---|---|--|
| $d_a$               |      | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |   |   |  |
| min.                | max. |       |       |       |       |       |          |                     |                         |   |   |  |
| 967                 | –    | –     | 1133  | 1102  | 1086  | 4     | 4        | 880                 | 1960                    | 118                                     | 900   | –  |
| 967                 | –    | –     | 1133  | 1112  | 1096  | 4     | 4        | 1200                | 2450                    | 141                                     | 900   | –  |
| 967                 | 999  | 1009  | 1133  | –     | –     | 4     | 4        | 2200                | 5500                    | 340                                     | 900   | –  |
| 967                 | 999  | 1009  | 1133  | –     | –     | 4     | 4        | 3900                | 11600                   | 880                                     | 800   | 220  |
| 978                 | 1020 | 1030  | 1222  | –     | –     | 6     | 6        | 3800                | 8500                    | 540                                     | 800   | –  |
| 978                 | 1020 | 1030  | 1222  | –     | –     | 6     | 6        | 5850                | 14600                   | 1090                                    | 750   | 220  |
| 978                 | –    | –     | 1332  | 1263  | 1247  | 6     | 6        | 7200                | 15600                   | 1110                                    | 700   | 260  |
| 978                 | 1048 | 1062  | 1332  | –     | –     | 6     | 6        | 7200                | 15600                   | 920                                     | 700   | 265  |
| 978                 | 1050 | 1060  | 1332  | –     | –     | 6     | 6        | 11400               | 28000                   | 2070                                    | 700   | 150  |
| 992                 | 1083 | 1095  | 1458  | –     | –     | 10    | 10       | 16300               | 36500                   | 2500                                    | 430   | –  |
| 1023                | –    | –     | 1187  | 1163  | 1147  | 5     | 5        | 1250                | 2650                    | 151                                     | 850   | –  |
| 1023                | 1053 | 1063  | 1197  | –     | –     | 5     | 5        | 2450                | 5850                    | 390                                     | 850   | –  |
| 1023                | 1053 | 1063  | 1197  | –     | –     | 5     | 5        | 3650                | 10000                   | 760                                     | 750   | 220  |
| 1023                | 1053 | 1063  | 1197  | –     | –     | 5     | 5        | 3650                | 10000                   | 760                                     | 750   | 220  |
| 1023                | 1053 | 1063  | 1197  | –     | –     | 5     | 5        | 4400                | 12700                   | 960                                     | 750   | 200  |
| 1028                | 1070 | 1080  | 1262  | –     | –     | 6     | 6        | 3550                | 8150                    | 520                                     | 800   | –  |
| 1028                | 1075 | 1085  | 1292  | –     | –     | 6     | 6        | 4400                | 9800                    | 600                                     | 750   | –  |
| 1028                | 1075 | 1085  | 1292  | –     | –     | 6     | 6        | 6550                | 16300                   | 1170                                    | 700   | 200  |
| 1028                | –    | –     | 1392  | 1323  | 1307  | 6     | 6        | 7500                | 16300                   | 1150                                    | 630   | 260  |
| 1028                | 1098 | 1112  | 1392  | –     | –     | 6     | 6        | 7500                | 16300                   | 960                                     | 630   | 255  |
| 1028                | 1095 | 1105  | 1392  | –     | –     | 6     | 6        | 10600               | 23600                   | 1700                                    | 630   | 170  |
| 1028                | 1100 | 1110  | 1392  | –     | –     | 6     | 6        | 12500               | 31000                   | 2250                                    | 630   | 140  |
| 1053                | –    | –     | 1217  | 1193  | 1177  | 5     | 5        | 1250                | 2650                    | 149                                     | 850   | –  |
| 1053                | –    | –     | 1227  | 1198  | 1182  | 5     | 5        | 2080                | 5300                    | 380                                     | 850   | 260  |
| 1083                | –    | –     | 1247  | 1223  | 1207  | 5     | 5        | 1320                | 2850                    | 159                                     | 800   | –  |
| 1083                | –    | –     | 1257  | 1228  | 1212  | 5     | 5        | 1320                | 2850                    | 159                                     | 800   | –  |
| 1083                | 1113 | 1123  | 1257  | –     | –     | 5     | 5        | 2550                | 6400                    | 415                                     | 800   | –  |
| 1083                | 1113 | 1123  | 1257  | –     | –     | 5     | 5        | 3800                | 10600                   | 790                                     | 700   | 220  |
| 1083                | 1113 | 1123  | 1257  | –     | –     | 5     | 5        | 4550                | 13400                   | 1000                                    | 700   | 190  |
| 1088                | 1143 | 1153  | 1372  | –     | –     | 6     | 6        | 4650                | 10600                   | 650                                     | 700   | –  |
| 1088                | 1140 | 1150  | 1372  | –     | –     | 6     | 6        | 7350                | 18600                   | 1330                                    | 700   | 180  |
| 1094                | –    | –     | 1466  | 1398  | 1382  | 8     | 8        | 8500                | 18600                   | 1300                                    | 600   | 220  |
| 1094                | 1163 | 1177  | 1466  | –     | –     | 8     | 8        | 8500                | 18600                   | 1080                                    | 600   | 231  |

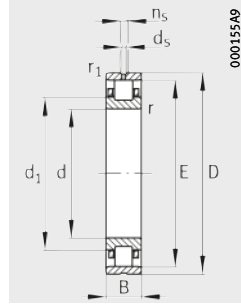


# Cylindrical roller bearings with cage

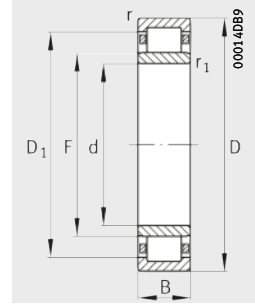
Single row  
Non-locating  
bearings



Design 1  
N



Design 2  
N with lubrication  
groove and holes



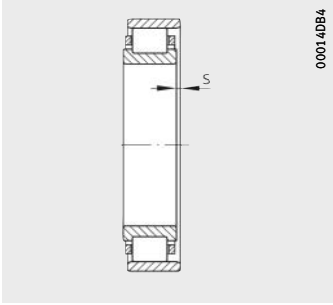
Design 3  
NU

Dimension table (continued) · Dimensions in mm

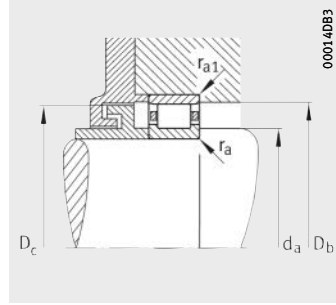
| Designation    | De-<br>sign     | Mass<br>m<br>≈kg | Dimensions |       |     |     |                |                 |       |       |                |                |                |                |
|----------------|-----------------|------------------|------------|-------|-----|-----|----------------|-----------------|-------|-------|----------------|----------------|----------------|----------------|
|                |                 |                  | d          | D     | B   | r   | r <sub>1</sub> | s <sup>3)</sup> | E     | F     | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| NU20/1060-E-M1 | 3               | 1 480            | 1 060      | 1 500 | 250 | 9,5 | 9,5            | 11,5            | 1 405 | 1 165 | 1 367          | –              | –              | –              |
| NU30/1060-M1   | 3               | 1 920            | 1 060      | 1 500 | 325 | 9,5 | 9,5            | 29,8            | 1 390 | 1 170 | 1 355          | –              | –              | –              |
| F-808288.ZL    | 3               | 118              | 1 110      | 1 240 | 85  | 6   | 2              | 5               | 1 205 | 1 145 | 1 195          | –              | –              | –              |
| Z-527467.ZL    | 2 <sup>1)</sup> | 239              | 1 120      | 1 340 | 94  | 6   | 6              | 17              | 1 280 | –     | –              | 1 199          | 4,8            | 9,5            |
| Z-535550.ZL    | 2               | 284              | 1 120      | 1 360 | 104 | 6   | 6              | 20              | 1 290 | –     | –              | 1 209          | 4,8            | 9,5            |
| NU18/1120-M1   | 3               | 312              | 1 120      | 1 360 | 106 | 6   | 6              | 11              | 1 305 | 1 185 | 1 286          | –              | –              | –              |
| NU38/1120-M    | 3               | 547              | 1 120      | 1 360 | 180 | 6   | 6              | 18              | 1 305 | 1 185 | 1 286          | –              | –              | –              |
| NU19/1120-M1   | 3               | 665              | 1 120      | 1 460 | 150 | 7,5 | 7,5            | 11,5            | 1 372 | 1 208 | 1 346          | –              | –              | –              |
| NU29/1120-M1   | 3               | 887              | 1 120      | 1 460 | 195 | 7,5 | 7,5            | 13,8            | 1 375 | 1 205 | 1 347,8        | –              | –              | –              |
| N10/1120-M1    | 1               | 1 300            | 1 120      | 1 580 | 200 | 9,5 | 9,5            | 16              | 1 465 | –     | –              | 1 276          | –              | –              |
| NU10/1120-M1   | 3               | 1 300            | 1 120      | 1 580 | 200 | 9,5 | 9,5            | 16              | 1 465 | 1 235 | 1 428          | –              | –              | –              |
| NU20/1120-E-M1 | 3               | 1 710            | 1 120      | 1 580 | 265 | 9,5 | 9,5            | 13              | 1 480 | 1 230 | 1 440          | –              | –              | –              |
| NU30/1120-M1   | 3               | 2 260            | 1 120      | 1 580 | 345 | 9,5 | 9,5            | 32,3            | 1 465 | 1 235 | 1 428          | –              | –              | –              |
| Z-527468.ZL    | 2 <sup>1)</sup> | 245              | 1 180      | 1 400 | 94  | 6   | 6              | 17              | 1 342 | –     | –              | 1 257,8        | 4,8            | 9,5            |
| NU18/1180-M1   | 3               | 329              | 1 180      | 1 420 | 106 | 6   | 6              | 11              | 1 365 | 1 245 | 1 346          | –              | –              | –              |
| NU38/1180-M    | 3               | 569              | 1 180      | 1 420 | 180 | 6   | 6              | 18              | 1 365 | 1 245 | 1 346          | –              | –              | –              |
| NU19/1180-M1   | 3               | 789              | 1 180      | 1 540 | 160 | 7,5 | 7,5            | 12,5            | 1 445 | 1 275 | 1 418          | –              | –              | –              |
| NU29/1180-M1   | 3               | 1 060            | 1 180      | 1 540 | 206 | 7,5 | 7,5            | 16,5            | 1 450 | 1 270 | 1 421          | –              | –              | –              |
| NU39/1180-E-M1 | 3               | 1 350            | 1 180      | 1 540 | 272 | 7,5 | 7,5            | 13,9            | 1 460 | 1 270 | 1 432          | –              | –              | –              |
| N10/1180-M1    | 1               | 1 520            | 1 180      | 1 660 | 212 | 9,5 | 9,5            | 17              | 1 540 | –     | –              | 1 343          | –              | –              |
| NU10/1180-M1   | 3               | 1 520            | 1 180      | 1 660 | 212 | 9,5 | 9,5            | 17              | 1 540 | 1 300 | 1 502          | –              | –              | –              |
| NU20/1180-E-M1 | 3               | 1 940            | 1 180      | 1 660 | 272 | 9,5 | 9,5            | 13              | 1 555 | 1 295 | 1 513          | –              | –              | –              |
| NU30/1180-M    | 3               | 2 520            | 1 180      | 1 660 | 355 | 9,5 | 9,5            | 32,3            | 1 540 | 1 300 | 1 502          | –              | –              | –              |
| Z-527469.ZL    | 2 <sup>2)</sup> | 278              | 1 250      | 1 480 | 95  | 6   | 6              | 17              | 1 417 | –     | –              | 1 333          | 4,8            | 15             |
| Z-566705.ZL    | 2               | 337              | 1 250      | 1 500 | 106 | 6   | 6              | 15              | 1 444 | –     | –              | 1 340          | 4,8            | 15             |
| NU18/1250-M1   | 3               | 390              | 1 250      | 1 500 | 112 | 6   | 6              | 11,4            | 1 444 | 1 316 | 1 423,3        | –              | –              | –              |
| NU38/1250-M    | 3               | 654              | 1 250      | 1 500 | 185 | 6   | 6              | 17,3            | 1 444 | 1 316 | 1 423,3        | –              | –              | –              |
| NU19/1250-M1   | 3               | 938              | 1 250      | 1 630 | 170 | 7,5 | 7,5            | 13              | 1 530 | 1 350 | 1 501,2        | –              | –              | –              |
| NU29/1250-M1   | 3               | 1 260            | 1 250      | 1 630 | 218 | 7,5 | 7,5            | 10,3            | 1 535 | 1 345 | 1 505          | –              | –              | –              |
| NU39/1250-E-M1 | 3               | 1 570            | 1 250      | 1 630 | 280 | 7,5 | 7,5            | 13,6            | 1 545 | 1 345 | 1 516          | –              | –              | –              |
| N10/1250-M1    | 1               | 1 710            | 1 250      | 1 750 | 218 | 9,5 | 9,5            | 18,5            | 1 625 | –     | –              | 1 419          | –              | –              |
| NU10/1250-M1   | 3               | 1 710            | 1 250      | 1 750 | 218 | 9,5 | 9,5            | 18,5            | 1 625 | 1 375 | 1 585          | –              | –              | –              |

1) With thread M8 for eye bolts on the end faces.

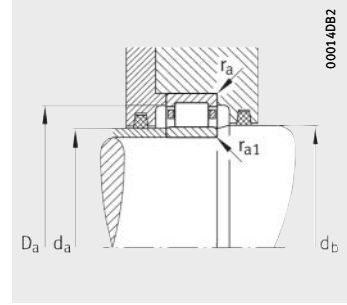
2) With thread M10 for eye bolts on the end faces.



3) Axial displacement "s"  
for N and NU



Mounting dimensions  
for N



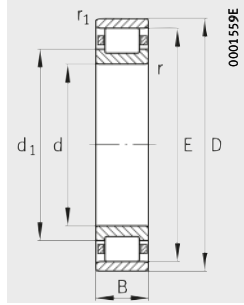
Mounting dimensions  
for NU

| Mounting dimensions |       |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|---|---|--|
| $d_a$               |       | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |   |   |  |
| min.                | max.  |       |       |       |       |       |          |                     |                         |   |   |  |
| 1 094               | 1 160 | 1 170 | 1 466 | –     | –     | 8     | 8        | 11 600              | 26 500                  | 1 830                                   | 600   | 150  |
| 1 094               | 1 165 | 1 175 | 1 466 | –     | –     | 8     | 8        | 13 200              | 32 500                  | 2 280                                   | 430   | –  |
| 1 119               | 1 140 | 1 150 | 1 217 | –     | –     | 5     | 2        | 1 120               | 3 450                   | 241                                     | 850   | –  |
| 1 143               | –     | –     | 1 317 | 1 288 | 1 272 | 5     | 5        | 1 370               | 3 050                   | 168                                     | 750   | –  |
| 1 143               | –     | –     | 1 337 | 1 298 | 1 282 | 5     | 5        | 1 370               | 3 050                   | 167                                     | 750   | –  |
| 1 143               | 1 180 | 1 190 | 1 337 | –     | –     | 5     | 5        | 2 850               | 7 100                   | 450                                     | 750   | –  |
| 1 143               | 1 180 | 1 190 | 1 337 | –     | –     | 5     | 5        | 5 100               | 15 000                  | 1 090                                   | 700   | 180  |
| 1 148               | 1 203 | 1 213 | 1 432 | –     | –     | 6     | 6        | 4 750               | 11 200                  | 680                                     | 700   | –  |
| 1 148               | 1 200 | 1 210 | 1 432 | –     | –     | 6     | 6        | 7 500               | 19 600                  | 1 380                                   | 630   | 170  |
| 1 154               | –     | –     | 1 546 | 1 474 | 1 456 | 8     | 8        | 9 000               | 20 000                  | 1 380                                   | 560   | 220  |
| 1 154               | 1 228 | 1 242 | 1 546 | –     | –     | 8     | 8        | 9 000               | 20 000                  | 1 150                                   | 560   | 215  |
| 1 154               | 1 225 | 1 235 | 1 546 | –     | –     | 8     | 8        | 12 000              | 27 500                  | 1 870                                   | 560   | 150  |
| 1 154               | 1 230 | 1 240 | 1 546 | –     | –     | 8     | 8        | 14 600              | 37 500                  | 2 550                                   | 400   | –  |
| 1 203               | –     | –     | 1 377 | 1 351 | 1 333 | 5     | 5        | 1 460               | 3 350                   | 180                                     | 750   | –  |
| 1 203               | 1 240 | 1 250 | 1 397 | –     | –     | 5     | 5        | 3 000               | 7 800                   | 485                                     | 700   | –  |
| 1 203               | 1 240 | 1 250 | 1 397 | –     | –     | 5     | 5        | 5 400               | 16 300                  | 1 180                                   | 630   | 160  |
| 1 208               | 1 270 | 1 280 | 1 512 | –     | –     | 6     | 6        | 5 100               | 12 000                  | 720                                     | 700   | –  |
| 1 208               | 1 265 | 1 275 | 1 512 | –     | –     | 6     | 6        | 8 500               | 22 000                  | 1 550                                   | 600   | 150  |
| 1 208               | 1 265 | 1 275 | 1 512 | –     | –     | 6     | 6        | 10 600              | 28 500                  | 1 790                                   | 600   | 130  |
| 1 214               | –     | –     | 1 626 | 1 549 | 1 531 | 8     | 8        | 10 000              | 22 800                  | 1 500                                   | 560   | 200  |
| 1 214               | 1 293 | 1 307 | 1 626 | –     | –     | 8     | 8        | 10 000              | 22 800                  | 1 260                                   | 560   | 199  |
| 1 214               | 1 290 | 1 300 | 1 626 | –     | –     | 8     | 8        | 13 400              | 31 000                  | 2 100                                   | 530   | 130  |
| 1 214               | 1 295 | 1 305 | 1 626 | –     | –     | 8     | 8        | 14 600              | 36 500                  | 2 420                                   | 380   | –  |
| 1 273               | –     | –     | 1 457 | 1 426 | 1 408 | 5     | 5        | 1 500               | 3 550                   | 189                                     | 700   | –  |
| 1 273               | –     | –     | 1 477 | 1 453 | 1 435 | 5     | 5        | 2 120               | 4 650                   | 255                                     | 700   | –  |
| 1 273               | 1 311 | 1 321 | 1 477 | –     | –     | 5     | 5        | 3 350               | 8 650                   | 530                                     | 700   | –  |
| 1 273               | 1 311 | 1 321 | 1 477 | –     | –     | 5     | 5        | 6 100               | 18 600                  | 1 320                                   | 600   | 140  |
| 1 278               | 1 345 | 1 355 | 1 602 | –     | –     | 6     | 6        | 5 700               | 13 700                  | 820                                     | 630   | –  |
| 1 278               | 1 340 | 1 350 | 1 602 | –     | –     | 6     | 6        | 9 650               | 25 500                  | 1 760                                   | 560   | 140  |
| 1 278               | 1 340 | 1 350 | 1 602 | –     | –     | 6     | 6        | 11 800              | 32 500                  | 2 220                                   | 560   | 110  |
| 1 284               | –     | –     | 1 716 | 1 634 | 1 616 | 8     | 8        | 10 600              | 24 500                  | 1 590                                   | 530   | 180  |
| 1 284               | 1 368 | 1 382 | 1 716 | –     | –     | 8     | 8        | 10 600              | 24 500                  | 1 340                                   | 530   | 186  |

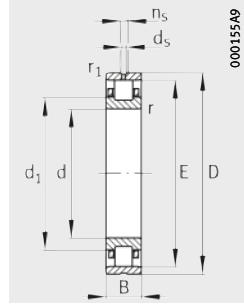


# Cylindrical roller bearings with cage

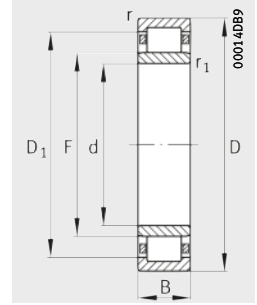
Single row  
Non-locating  
bearings



Design 1  
N



Design 2  
N with lubrication  
groove and holes



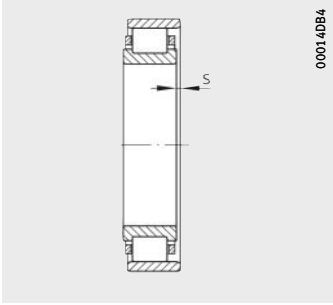
Design 3  
NU

**Dimension table** (continued) · Dimensions in mm

| Designation           | De-<br>sign     | Mass<br>m<br>≈kg | Dimensions   |       |     |      |                |                 |       |       |                |                |                |                |
|-----------------------|-----------------|------------------|--------------|-------|-----|------|----------------|-----------------|-------|-------|----------------|----------------|----------------|----------------|
|                       |                 |                  | d            | D     | B   | r    | r <sub>1</sub> | s <sup>2)</sup> | E     | F     | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|                       |                 |                  |              |       |     | min. | min.           |                 |       |       | ≈              | ≈              |                |                |
| <b>NU20/1250-E-M1</b> | 3               | 2 270            | <b>1 250</b> | 1 750 | 290 | 9,5  | 9,5            | 13,5            | 1 635 | 1 375 | 1 593          | –              | –              | –              |
| <b>NU30/1250-M</b>    | 3               | 2 940            | <b>1 250</b> | 1 750 | 375 | 9,5  | 9,5            | 35,3            | 1 625 | 1 375 | 1 585          | –              | –              | –              |
| <b>Z-529599.ZL</b>    | 2 <sup>1)</sup> | 301              | <b>1 320</b> | 1 550 | 95  | 6    | 6              | 17              | 1 487 | –     | –              | 1 403          | 4,8            | 15             |
| <b>Z-526748.ZL</b>    | 2               | 478              | <b>1 320</b> | 1 600 | 122 | 6    | 6              | 10              | 1 533 | –     | –              | 1 422          | 9,5            | 17,7           |
| <b>NU18/1320-M1</b>   | 3               | 497              | <b>1 320</b> | 1 600 | 122 | 6    | 6              | 12,8            | 1 533 | 1 397 | 1 511          | –              | –              | –              |
| <b>NU38/1320-M</b>    | 3               | 854              | <b>1 320</b> | 1 600 | 206 | 6    | 6              | 20,5            | 1 533 | 1 397 | 1 511          | –              | –              | –              |
| <b>NU19/1320-M1</b>   | 3               | 1 080            | <b>1 320</b> | 1 720 | 175 | 7,5  | 7,5            | 13              | 1 615 | 1 425 | 1 584,6        | –              | –              | –              |
| <b>NU29/1320-M1</b>   | 3               | 1 470            | <b>1 320</b> | 1 720 | 230 | 7,5  | 7,5            | 17,6            | 1 620 | 1 420 | 1 588          | –              | –              | –              |
| <b>NU39/1320-E-M1</b> | 3               | 1 850            | <b>1 320</b> | 1 720 | 300 | 7,5  | 7,5            | 14,9            | 1 630 | 1 420 | 1 600          | –              | –              | –              |
| <b>N10/1320-M1</b>    | 1               | 2 040            | <b>1 320</b> | 1 850 | 230 | 12   | 12             | 19              | 1 715 | –     | –              | 1 501          | –              | –              |
| <b>NU10/1320-M1</b>   | 3               | 2 030            | <b>1 320</b> | 1 850 | 230 | 12   | 12             | 19              | 1 715 | 1 455 | 1 673          | –              | –              | –              |
| <b>NU20/1320-E-M1</b> | 3               | 2 650            | <b>1 320</b> | 1 850 | 300 | 12   | 12             | 14              | 1 725 | 1 455 | 1 682          | –              | –              | –              |
| <b>NU30/1320-M</b>    | 3               | 3 520            | <b>1 320</b> | 1 850 | 400 | 12   | 12             | 39              | 1 715 | 1 455 | 1 673          | –              | –              | –              |
| <b>Z-527470.ZL</b>    | 2 <sup>1)</sup> | 362              | <b>1 400</b> | 1 650 | 100 | 7,5  | 7,5            | 18              | 1 577 | –     | –              | 1 493          | 4,8            | 15             |
| <b>NU18/1400-M1</b>   | 3               | 625              | <b>1 400</b> | 1 700 | 132 | 7,5  | 7,5            | 13,4            | 1 630 | 1 480 | 1 606          | –              | –              | –              |
| <b>NU38/1400-M</b>    | 3               | 1 050            | <b>1 400</b> | 1 700 | 224 | 7,5  | 7,5            | 21,5            | 1 630 | 1 480 | 1 606          | –              | –              | –              |
| <b>NU19/1400-M1</b>   | 3               | 1 270            | <b>1 400</b> | 1 820 | 185 | 9,5  | 9,5            | 14              | 1 710 | 1 510 | 1 678          | –              | –              | –              |
| <b>NU29/1400-M</b>    | 3               | 1 710            | <b>1 400</b> | 1 820 | 243 | 9,5  | 9,5            | 18,8            | 1 715 | 1 505 | 1 681          | –              | –              | –              |
| <b>NU39/1400-E-M1</b> | 3               | 2 170            | <b>1 400</b> | 1 820 | 315 | 9,5  | 9,5            | 15,5            | 1 726 | 1 506 | 1 694          | –              | –              | –              |
| <b>N10/1400-M1</b>    | 1               | 2 350            | <b>1 400</b> | 1 950 | 243 | 12   | 12             | 19,5            | 1 810 | –     | –              | 1 587          | –              | –              |
| <b>NU10/1400-M1</b>   | 3               | 2 350            | <b>1 400</b> | 1 950 | 243 | 12   | 12             | 19,5            | 1 810 | 1 540 | 1 767          | –              | –              | –              |
| <b>NU20/1400-E-M1</b> | 3               | 3 010            | <b>1 400</b> | 1 950 | 315 | 12   | 12             | 26,4            | 1 820 | 1 540 | 1 775          | –              | –              | –              |
| <b>NU30/1400-M</b>    | 3               | 3 970            | <b>1 400</b> | 1 950 | 412 | 12   | 12             | 39,5            | 1 810 | 1 540 | 1 767          | –              | –              | –              |
| <b>Z-529600.ZL</b>    | 2 <sup>1)</sup> | 433              | <b>1 500</b> | 1 760 | 105 | 7,5  | 7,5            | 20              | 1 682 | –     | –              | 1 598          | 8              | 15             |
| <b>NU18/1500-M1</b>   | 3               | 750              | <b>1 500</b> | 1 820 | 140 | 7,5  | 7,5            | 14,5            | 1 745 | 1 585 | 1 719          | –              | –              | –              |
| <b>NU38/1500-M</b>    | 3               | 1 300            | <b>1 500</b> | 1 820 | 243 | 7,5  | 7,5            | 23,8            | 1 745 | 1 585 | 1 719          | –              | –              | –              |
| <b>NU29/1500-M</b>    | 3               | 2 110            | <b>1 500</b> | 1 950 | 258 | 9,5  | 9,5            | 12              | 1 835 | 1 615 | 1 800          | –              | –              | –              |
| <b>NU39/1500-E-M</b>  | 3               | 2 640            | <b>1 500</b> | 1 950 | 335 | 9,5  | 9,5            | 15,5            | 1 851 | 1 611 | 1 817          | –              | –              | –              |

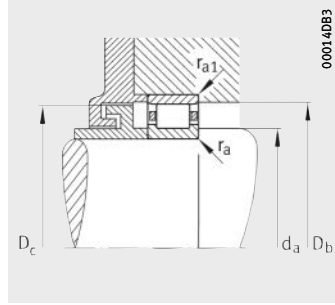
<sup>1)</sup> With thread M10 for eye bolts on the end faces.





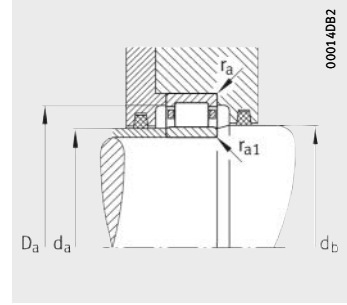
000140B4

2) Axial displacement "s" for N and NU



000140B3

Mounting dimensions for N



000140B2

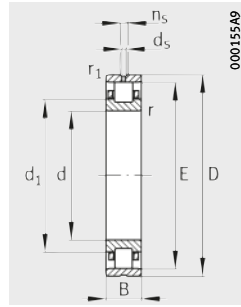
Mounting dimensions for NU

| Mounting dimensions |       |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$               |       | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
| min.                | max.  |       |       |       |       |       |          |                     |                         |                                      |  |   |
| 1 284               | 1 370 | 1 380 | 1 716 | –     | –     | 8     | 8        | 13 700              | 32 500                  | 2 190                                | 530  | 130   |
| 1 284               | 1 370 | 1 380 | 1 716 | –     | –     | 8     | 8        | 16 300              | 41 500                  | 2 700                                | 360  | –   |
| 1 243               | –     | –     | 1 527 | 1 496 | 1 478 | 5     | 5        | 1 560               | 3 750                   | 197                                  | 700  | –   |
| 1 243               | –     | –     | 1 577 | 1 542 | 1 524 | 5     | 5        | 2 600               | 6 000                   | 315                                  | 630  | –   |
| 1 243               | 1 392 | 1 402 | 1 577 | –     | –     | 5     | 5        | 3 800               | 10 200                  | 600                                  | 630  | –   |
| 1 243               | 1 392 | 1 402 | 1 577 | –     | –     | 5     | 5        | 6 800               | 21 200                  | 1 450                                | 560  | 130   |
| 1 348               | 1 420 | 1 430 | 1 692 | –     | –     | 6     | 6        | 6 400               | 15 600                  | 910                                  | 600  | –   |
| 1 348               | 1 415 | 1 425 | 1 692 | –     | –     | 6     | 6        | 10 600              | 29 000                  | 1 930                                | 530  | 120   |
| 1 348               | 1 415 | 1 425 | 1 692 | –     | –     | 6     | 6        | 12 900              | 36 000                  | 2 420                                | 530  | 110   |
| 1 362               | –     | –     | 1 808 | 1 724 | 1 706 | 10    | 10       | 11 800              | 27 000                  | 1 750                                | 500  | 170   |
| 1 362               | 1 448 | 1 462 | 1 808 | –     | –     | 10    | 10       | 11 800              | 27 000                  | 1 480                                | 500  | 171   |
| 1 362               | 1 450 | 1 460 | 1 808 | –     | –     | 10    | 10       | 15 600              | 38 000                  | 2 500                                | 500  | 110   |
| 1 362               | 1 450 | 1 460 | 1 808 | –     | –     | 10    | 10       | 18 300              | 48 000                  | 3 100                                | 340  | –   |
| 1 428               | –     | –     | 1 622 | 1 586 | 1 568 | 6     | 6        | 1 600               | 4 000                   | 206                                  | 630  | –   |
| 1 428               | 1 475 | 1 485 | 1 672 | –     | –     | 6     | 6        | 4 550               | 12 000                  | 700                                  | 600  | –   |
| 1 428               | 1 475 | 1 485 | 1 672 | –     | –     | 6     | 6        | 8 150               | 25 500                  | 1 710                                | 530  | 120   |
| 1 434               | 1 505 | 1 515 | 1 786 | –     | –     | 8     | 8        | 7 200               | 17 600                  | 1 000                                | 560  | –   |
| 1 434               | 1 500 | 1 510 | 1 786 | –     | –     | 8     | 8        | 11 400              | 30 500                  | 2 020                                | 500  | 120   |
| 1 434               | 1 501 | 1 511 | 1 786 | –     | –     | 8     | 8        | 14 300              | 40 500                  | 2 700                                | 500  | 95  |
| 1 442               | –     | –     | 1 908 | 1 819 | 1 801 | 10    | 10       | 13 200              | 31 000                  | 1 980                                | 480  | 150   |
| 1 442               | 1 533 | 1 547 | 1 908 | –     | –     | 10    | 10       | 13 200              | 31 000                  | 1 670                                | 480  | 155   |
| 1 442               | 1 535 | 1 545 | 1 908 | –     | –     | 10    | 10       | 16 600              | 40 500                  | 2 600                                | 480  | 110   |
| 1 442               | 1 535 | 1 545 | 1 908 | –     | –     | 10    | 10       | 19 300              | 51 000                  | 3 250                                | 340  | –   |
| 1 528               | –     | –     | 1 732 | 1 691 | 1 673 | 6     | 6        | 1 630               | 4 150                   | 214                                  | 600  | –   |
| 1 528               | 1 580 | 1 590 | 1 792 | –     | –     | 6     | 6        | 5 200               | 14 000                  | 780                                  | 560  | –   |
| 1 528               | 1 580 | 1 590 | 1 792 | –     | –     | 6     | 6        | 9 150               | 29 000                  | 1 890                                | 500  | 110   |
| 1 534               | 1 610 | 1 620 | 1 916 | –     | –     | 8     | 8        | 12 700              | 34 500                  | 2 250                                | 480  | 110   |
| 1 534               | 1 606 | 1 616 | 1 916 | –     | –     | 8     | 8        | 16 000              | 45 000                  | 2 850                                | 480  | 90  |

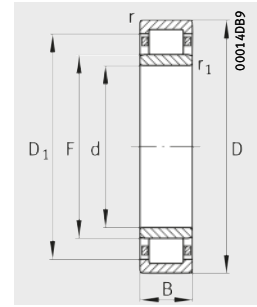


# Cylindrical roller bearings with cage

Single row  
Non-locating bearings



Design 2  
N with lubrication groove and holes



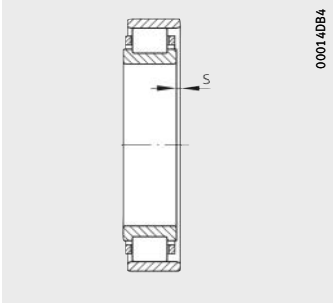
Design 3  
NU

**Dimension table** (continued) · Dimensions in mm

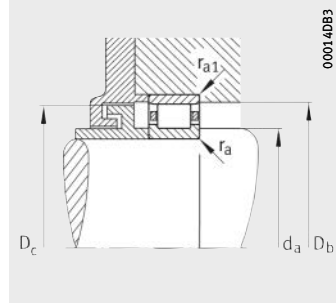
| Designation         | De-<br>sign     | Mass<br>m<br>≈kg | Dimensions   |       |     |      |                |                 |      |      |                |                |                |                |
|---------------------|-----------------|------------------|--------------|-------|-----|------|----------------|-----------------|------|------|----------------|----------------|----------------|----------------|
|                     |                 |                  | d            | D     | B   | r    | r <sub>1</sub> | s <sup>3)</sup> | E    | F    | D <sub>1</sub> | d <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|                     |                 |                  |              |       |     | min. | min.           |                 |      |      | ≈              | ≈              |                |                |
| <b>Z-529601.ZL</b>  | 2 <sup>1)</sup> | 553              | <b>1 600</b> | 1890  | 110 | 7,5  | 7,5            | 21              | 1799 | –    | –              | 1711           | 4,8            | 15             |
| <b>NU28/1600-MA</b> | 3               | 1 270            | <b>1 600</b> | 1950  | 200 | 7,5  | 7,5            | 20              | 1870 | 1690 | 1841           | –              | –              | –              |
| <b>NU38/1600-M</b>  | 3               | 1 670            | <b>1 600</b> | 1950  | 265 | 7,5  | 7,5            | 24,3            | 1870 | 1690 | 1841           | –              | –              | –              |
| <b>NU29/1600-M</b>  | 3               | 2 310            | <b>1 600</b> | 2060  | 265 | 9,5  | 9,5            | 12,3            | 1945 | 1715 | 1908           | –              | –              | –              |
| <b>Z-529602.ZL</b>  | 2 <sup>1)</sup> | 631              | <b>1 700</b> | 2 000 | 115 | 7,5  | 7,5            | 22              | 1906 | –    | –              | 1815           | 4,8            | 15             |
| <b>NU38/1700-M</b>  | 3               | 1 860            | <b>1 700</b> | 2 060 | 272 | 7,5  | 7,5            | 23,5            | 1980 | 1790 | 1950           | –              | –              | –              |
| <b>NU29/1700-M</b>  | 3               | 2 730            | <b>1 700</b> | 2 180 | 280 | 9,5  | 9,5            | 12,9            | 2060 | 1820 | 2022           | –              | –              | –              |
| <b>Z-529603.ZL</b>  | 2 <sup>1)</sup> | 717              | <b>1 800</b> | 2 110 | 120 | 9,5  | 9,5            | 23              | 2015 | –    | –              | 1918           | 8              | 15             |
| <b>NU38/1800-M</b>  | 3               | 2 210            | <b>1 800</b> | 2 180 | 290 | 9,5  | 9,5            | 25,5            | 2095 | 1895 | 2063           | –              | –              | –              |
| <b>NU29/1800-M</b>  | 3               | 3 110            | <b>1 800</b> | 2 300 | 290 | 12   | 12             | 14              | 2175 | 1925 | 2135           | –              | –              | –              |
| <b>Z-529604.ZL</b>  | 2 <sup>2)</sup> | 829              | <b>1 900</b> | 2 230 | 125 | 9,5  | 9,5            | 23              | 2129 | –    | –              | 2025           | 8              | 15             |
| <b>NU38/1900-M</b>  | 3               | 2 560            | <b>1 900</b> | 2 300 | 300 | 9,5  | 9,5            | 26              | 2210 | 2000 | 2176           | –              | –              | –              |
| <b>NU29/1900-M</b>  | 3               | 3 700            | <b>1 900</b> | 2 430 | 308 | 12   | 12             | 14,4            | 2300 | 2030 | 2257           | –              | –              | –              |
| <b>Z-529605.ZL</b>  | 2 <sup>2)</sup> | 977              | <b>2 000</b> | 2 350 | 130 | 9,5  | 9,5            | 24              | 2243 | –    | –              | 2132           | 8              | 15             |
| <b>NU38/2000-M</b>  | 3               | 3 130            | <b>2 000</b> | 2 430 | 325 | 9,5  | 9,5            | 29,8            | 2330 | 2110 | 2295           | –              | –              | –              |
| <b>Z-540513.ZL</b>  | 3               | 627              | <b>2 550</b> | 2 780 | 100 | 4    | 4              | 14,5            | 2710 | 2626 | 2696           | –              | –              | –              |

1) With thread M12 for eye bolts on the end faces.

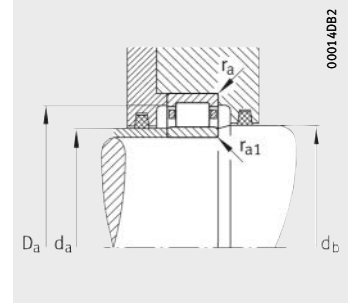
2) With thread M16 for eye bolts on the end faces.



3) Axial displacement "s"  
for N and NU

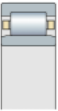


Mounting dimensions  
for N



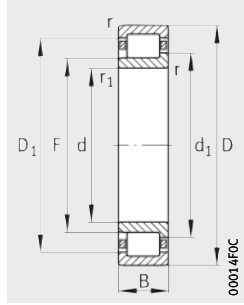
Mounting dimensions  
for NU

| Mounting dimensions |       |       |       |       |       |       |          | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------|-------|-------|-------|-------|-------|----------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$               |       | $d_b$ | $D_a$ | $D_b$ | $D_c$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
| min.                | max.  | min.  | max.  | min.  | max.  | max.  | max.     |                     |                         |                                      |  |   |
| 1 628               | –     | –     | 1 862 | 1 808 | 1 790 | 6     | 6        | 1 830               | 4 750                   | 239                                  | 560  | –   |
| 1 628               | 1 685 | 1 695 | 1 922 | –     | –     | 6     | 6        | 8 300               | 24 000                  | 1 540                                | 480  | 120   |
| 1 628               | 1 685 | 1 695 | 1 922 | –     | –     | 6     | 6        | 11 000              | 34 000                  | 2 200                                | 480  | 95  |
| 1 634               | 1 710 | 1 720 | 2 026 | –     | –     | 8     | 8        | 13 400              | 37 500                  | 2 380                                | 480  | 100   |
| 1 728               | –     | –     | 1 972 | 1 916 | 1 896 | 6     | 6        | 1 930               | 5 000                   | 255                                  | 530  | –   |
| 1 728               | 1 785 | 1 795 | 2 032 | –     | –     | 6     | 6        | 12 200              | 38 000                  | 2 460                                | 480  | 85  |
| 1 734               | 1 815 | 1 825 | 2 146 | –     | –     | 8     | 8        | 15 000              | 42 500                  | 2 600                                | 450  | 90  |
| 1 834               | –     | –     | 2 076 | 2 025 | 2 005 | 8     | 8        | 2 200               | 5 850                   | 290                                  | 500  | –   |
| 1 834               | 1 890 | 1 900 | 2 146 | –     | –     | 8     | 8        | 13 400              | 42 500                  | 2 650                                | 450  | 80  |
| 1 842               | 1 920 | 1 930 | 2 258 | –     | –     | 10    | 10       | 16 000              | 46 500                  | 2 800                                | 430  | 80  |
| 1 934               | –     | –     | 2 196 | 2 139 | 2 119 | 8     | 8        | 2 500               | 6 700                   | 325                                  | 480  | –   |
| 1 934               | 1 995 | 2 005 | 2 266 | –     | –     | 8     | 8        | 15 000              | 48 000                  | 2 950                                | 430  | 70  |
| 1 942               | 2 025 | 2 035 | 2 388 | –     | –     | 10    | 10       | 18 300              | 52 000                  | 3 150                                | 430  | 75  |
| 2 034               | –     | –     | 2 316 | 2 253 | 2 233 | 8     | 8        | 2 800               | 7 500                   | 360                                  | 480  | –   |
| 2 034               | 2 105 | 2 115 | 2 396 | –     | –     | 8     | 8        | 16 600              | 54 000                  | 3 250                                | 430  | 67  |
| 2 565               | –     | –     | 2 765 | –     | –     | 3     | 3        | 2 750               | 11 600                  | 470                                  | 380  | –   |

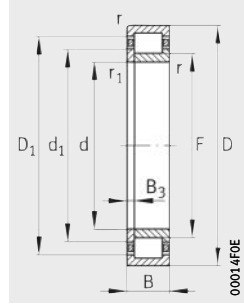


# Cylindrical roller bearings with cage

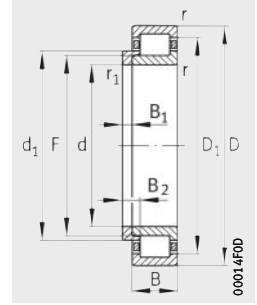
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

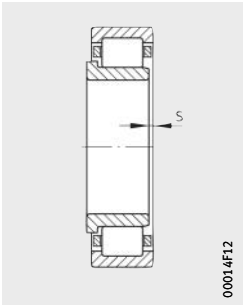


Design 1  
NJ and HJ  
Locating bearing

## Dimension table - Dimensions in mm

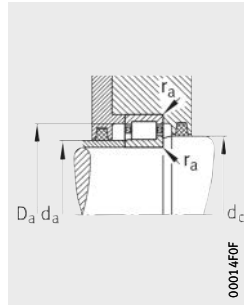
| Designation   |        |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |     |     |      |                |                 |     |                |                |  |
|---------------|--------|-------------------|-------------|----------------|--------------------------|------------|-----|-----|------|----------------|-----------------|-----|----------------|----------------|--|
| Bearing       | X-life | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D   | B   | r    | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |  |
|               |        |                   |             |                |                          |            |     |     | min. | min.           |                 | ≈   | ≈              |                |  |
| NJ426-M1      | -      | -                 | 1           | 41,2           | -                        | 130        | 340 | 78  | 5    | 5              | 6,2             | 185 | 265,9          | 204,2          |  |
| NJ426-M1      | -      | HJ426             | 1           | 41,2           | 12,2                     | 130        | 340 | 78  | 5    | 5              | -               | 185 | 265,9          | 204,2          |  |
| NUP426-M1     | -      | -                 | 1           | 41,9           | -                        | 130        | 340 | 78  | 5    | 5              | -               | 185 | 265,9          | 204,2          |  |
| NJ428-M1      | -      | -                 | 1           | 48,2           | -                        | 140        | 360 | 82  | 5    | 5              | 7,6             | 198 | 282,9          | 218,2          |  |
| NJ428-M1      | -      | HJ428             | 1           | 48,2           | 3,79                     | 140        | 360 | 82  | 5    | 5              | -               | 198 | 282,9          | 218,2          |  |
| NUP428-M1     | -      | -                 | 1           | 49             | -                        | 140        | 360 | 82  | 5    | 5              | -               | 198 | 282,9          | 218,2          |  |
| NJ330-E-M1    | XL     | -                 | 1           | 27,4           | -                        | 150        | 320 | 65  | 4    | 4              | 5,5             | 193 | 269,8          | 209,5          |  |
| NJ330-E-M1    | XL     | HJ330-E           | 1           | 27,4           | 2,33                     | 150        | 320 | 65  | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NJ330-E-M1A   | XL     | -                 | 1           | 27,4           | -                        | 150        | 320 | 65  | 4    | 4              | 5,5             | 193 | 269,8          | 209,5          |  |
| NJ330-E-M1A   | XL     | HJ330-E           | 1           | 27,4           | 2,33                     | 150        | 320 | 65  | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NJ330-E-MP1A  | XL     | -                 | 1           | 26,9           | -                        | 150        | 320 | 65  | 4    | 4              | 5,5             | 193 | 269,8          | 209,5          |  |
| NJ330-E-MP1A  | XL     | HJ330-E           | 1           | 26,9           | 2,33                     | 150        | 320 | 65  | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NJ330-E-MPA   | XL     | -                 | 1           | 28,3           | -                        | 150        | 320 | 65  | 4    | 4              | 5,5             | 193 | 269,8          | 209,5          |  |
| NJ330-E-MPA   | XL     | HJ330-E           | 1           | 28,3           | 2,33                     | 150        | 320 | 65  | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NUP330-E-M1   | XL     | -                 | 1           | 27,8           | -                        | 150        | 320 | 65  | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NUP330-E-M1A  | XL     | -                 | 1           | 27,8           | -                        | 150        | 320 | 65  | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NUP330-E-MP1A | XL     | -                 | 1           | 27,3           | -                        | 150        | 320 | 65  | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NUP330-E-MPA  | XL     | -                 | 1           | 28,7           | -                        | 150        | 320 | 65  | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NJ2330-E-M1   | XL     | -                 | 1           | 44,1           | -                        | 150        | 320 | 108 | 4    | 4              | 9,7             | 193 | 269,8          | 209,5          |  |
| NJ2330-E-M1   | XL     | HJ2330-E          | 1           | 44,1           | 2,55                     | 150        | 320 | 108 | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NJ2330-E-M1A  | XL     | -                 | 1           | 44,1           | -                        | 150        | 320 | 108 | 4    | 4              | 9,7             | 193 | 269,8          | 209,5          |  |
| NJ2330-E-M1A  | XL     | HJ2330-E          | 1           | 44,1           | 2,55                     | 150        | 320 | 108 | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NJ2330-E-MP1A | XL     | -                 | 1           | 43,9           | -                        | 150        | 320 | 108 | 4    | 4              | 9,7             | 193 | 269,8          | 209,5          |  |
| NJ2330-E-MP1A | XL     | HJ2330-E          | 1           | 43,9           | 2,55                     | 150        | 320 | 108 | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NUP2330-E-M1  | XL     | -                 | 1           | 44,8           | -                        | 150        | 320 | 108 | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NUP2330-E-M1A | XL     | -                 | 1           | 44,8           | -                        | 150        | 320 | 108 | 4    | 4              | -               | 193 | 269,8          | 209,5          |  |
| NJ430-M1      | -      | -                 | 1           | 55,3           | -                        | 150        | 380 | 85  | 5    | 5              | 8,1             | 213 | 297,9          | 233,2          |  |
| NJ430-M1      | -      | HJ430             | 1           | 55,3           | 4,76                     | 150        | 380 | 85  | 5    | 5              | -               | 213 | 297,9          | 233,2          |  |
| NUP430-M1     | -      | -                 | 1           | 56,3           | -                        | 150        | 380 | 85  | 5    | 5              | -               | 213 | 297,9          | 233,2          |  |
| NJ332-E-M1    | -      | -                 | 1           | 32,3           | -                        | 160        | 340 | 68  | 4    | 4              | 5,6             | 204 | 286            | 221,6          |  |
| NJ332-E-M1    | -      | HJ332-E           | 1           | 32,3           | 2,58                     | 160        | 340 | 68  | 4    | 4              | -               | 204 | 286            | 221,6          |  |
| NJ332-E-M1A   | -      | -                 | 1           | 32,3           | -                        | 160        | 340 | 68  | 4    | 4              | 5,6             | 204 | 286            | 221,6          |  |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



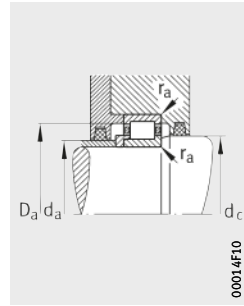
00014F12

2) Axial displacement "s" for NJ



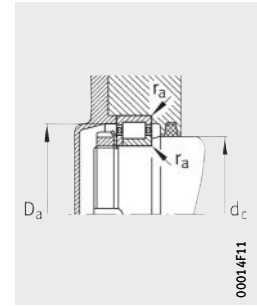
00014F0F

Mounting dimensions for NJ



00014F10

Mounting dimensions for NJ and HJ



00014F11

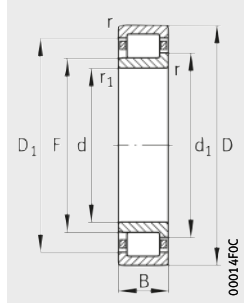
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |      |                |                |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed | Reference speed |
|----------------|----------------|----------------|---------------------|------|----------------|----------------|----------------|-----------------|---------------------|-----------------------|--------------------|----------------|-----------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub> | n <sub>B</sub>  |
|                |                |                | min. <sup>1)</sup>  | max. |                |                |                |                 |                     |                       |                    |                |                 |
| -              | -              | -              | 154                 | 183  | 208            | 316            | 4              | 4               | 865                 | 1020                  | 114                | 3 200          | 1 900           |
| 18             | 32             | -              | 154                 | 183  | 208            | 316            | 4              | 4               | 865                 | 1020                  | 114                | 3 200          | 1 900           |
| -              | -              | 14             | 154                 | 183  | 208            | 316            | 4              | 4               | 865                 | 1020                  | 114                | 3 200          | 1 900           |
| -              | -              | -              | 164                 | 195  | 222            | 336            | 4              | 4               | 930                 | 1 120                 | 123                | 3 000          | 1 800           |
| 18             | 33             | -              | 164                 | 195  | 222            | 336            | 4              | 4               | 930                 | 1 120                 | 123                | 3 000          | 1 800           |
| -              | -              | 15             | 164                 | 195  | 222            | 336            | 4              | 4               | 930                 | 1 120                 | 123                | 3 000          | 1 800           |
| -              | -              | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 1 940           |
| 15             | 25             | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 1 940           |
| -              | -              | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 1 940           |
| 15             | 25             | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 1 940           |
| -              | -              | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 2 000           |
| 15             | 25             | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 2 000           |
| -              | -              | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 2 000           |
| 15             | 25             | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 2 000           |
| -              | -              | 10             | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 1 940           |
| -              | -              | 10             | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 1 940           |
| -              | -              | 10             | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 2 000           |
| -              | -              | 10             | 167                 | 190  | 213            | 303            | 3              | 3               | 900                 | 930                   | 126                | 3 600          | 2 000           |
| -              | -              | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 1 380               | 1 600                 | 226                | 3 200          | 1 460           |
| 15             | 31,5           | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 1 380               | 1 600                 | 226                | 3 200          | 1 460           |
| -              | -              | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 1 380               | 1 600                 | 226                | 3 200          | 1 460           |
| 15             | 31,5           | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 1 380               | 1 600                 | 226                | 3 200          | 1 460           |
| -              | -              | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 1 380               | 1 600                 | 226                | 3 200          | 1 460           |
| 15             | 31,5           | -              | 167                 | 190  | 213            | 303            | 3              | 3               | 1 380               | 1 600                 | 226                | 3 200          | 1 460           |
| -              | -              | 16,5           | 167                 | 190  | 213            | 303            | 3              | 3               | 1 380               | 1 600                 | 226                | 3 200          | 1 460           |
| -              | -              | 16,5           | 167                 | 190  | 213            | 303            | 3              | 3               | 1 380               | 1 600                 | 226                | 3 200          | 1 460           |
| -              | -              | -              | 174                 | 210  | 237            | 356            | 4              | 4               | 980                 | 1 220                 | 132                | 2 800          | 1 600           |
| 20             | 36,5           | -              | 174                 | 210  | 237            | 356            | 4              | 4               | 980                 | 1 220                 | 132                | 2 800          | 1 600           |
| -              | -              | 16,5           | 174                 | 210  | 237            | 356            | 4              | 4               | 980                 | 1 220                 | 132                | 2 800          | 1 600           |
| -              | -              | -              | 177                 | 200  | 228            | 323            | 3              | 3               | 865                 | 1060                  | 114                | 3 000          | 1 770           |
| 15             | 25             | -              | 177                 | 200  | 228            | 323            | 3              | 3               | 865                 | 1060                  | 114                | 3 000          | 1 770           |
| -              | -              | -              | 177                 | 200  | 228            | 323            | 3              | 3               | 865                 | 1060                  | 114                | 3 000          | 1 770           |

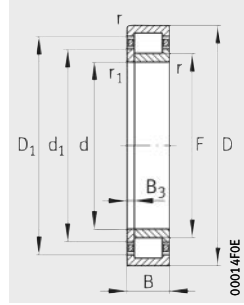


# Cylindrical roller bearings with cage

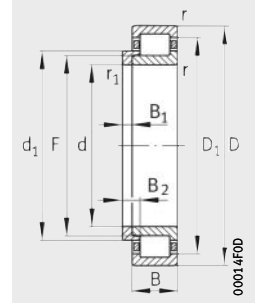
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

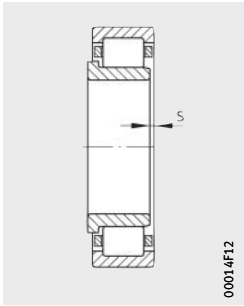


Design 1  
NJ and HJ  
Locating bearing

**Dimension table (continued)** · Dimensions in mm

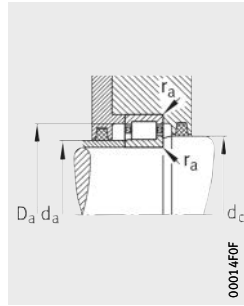
| Designation     |        |                   | De-<br>sign | Mass<br>m |                   | Dimensions |     |     |   |                |                 |     |                |                |
|-----------------|--------|-------------------|-------------|-----------|-------------------|------------|-----|-----|---|----------------|-----------------|-----|----------------|----------------|
| Bearing         | X-life | L-section<br>ring |             | Bearing   | L-section<br>ring | d          | D   | B   | r | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |
|                 |        |                   | ≈kg         | ≈kg       | min.              | min.       | ≈   | ≈   |   |                |                 |     |                |                |
| NJ332-E-M1A     | -      | HJ332-E           | 1           | 32,3      | 2,58              | 160        | 340 | 68  | 4 | 4              | -               | 204 | 286            | 221,6          |
| NUP332-E-M1     | -      | -                 | 1           | 32,7      | -                 | 160        | 340 | 68  | 4 | 4              | -               | 204 | 286            | 221,6          |
| NUP332-E-M1A    | -      | -                 | 1           | 32,7      | -                 | 160        | 340 | 68  | 4 | 4              | -               | 204 | 286            | 221,6          |
| NUP332-E-MP1A   | -      | -                 | 1           | 33        | -                 | 160        | 340 | 68  | 4 | 4              | -               | 204 | 286            | 221,6          |
| NJ2332-E-M1     | -      | -                 | 1           | 52,3      | -                 | 160        | 340 | 114 | 4 | 4              | 9,9             | 204 | 286            | 221,6          |
| NJ2332-E-M1     | -      | HJ2332-E          | 1           | 52,3      | 2,85              | 160        | 340 | 114 | 4 | 4              | -               | 204 | 286            | 221,6          |
| NJ2332-E-M1A    | -      | -                 | 1           | 52,3      | -                 | 160        | 340 | 114 | 4 | 4              | 9,9             | 204 | 286            | 221,6          |
| NJ2332-E-M1A    | -      | HJ2332-E          | 1           | 52,3      | 2,85              | 160        | 340 | 114 | 4 | 4              | -               | 204 | 286            | 221,6          |
| NJ2332-E-MP1A   | -      | -                 | 1           | 54,1      | -                 | 160        | 340 | 114 | 4 | 4              | 9,9             | 204 | 286            | 221,6          |
| NJ2332-E-MP1A   | -      | HJ2332-E          | 1           | 54,1      | 2,85              | 160        | 340 | 114 | 4 | 4              | -               | 204 | 286            | 221,6          |
| NJ2332-E-MPA    | -      | -                 | 1           | 54,9      | -                 | 160        | 340 | 114 | 4 | 4              | 9,9             | 204 | 286            | 221,6          |
| NJ2332-E-MPA    | -      | HJ2332-E          | 1           | 54,9      | 2,85              | 160        | 340 | 114 | 4 | 4              | -               | 204 | 286            | 221,6          |
| NUP2332-E-M1    | -      | -                 | 1           | 53,2      | -                 | 160        | 340 | 114 | 4 | 4              | -               | 204 | 286            | 221,6          |
| NUP2332-E-M1A   | -      | -                 | 1           | 53,2      | -                 | 160        | 340 | 114 | 4 | 4              | -               | 204 | 286            | 221,6          |
| NUP2332-E-MPA   | -      | -                 | 1           | 55,7      | -                 | 160        | 340 | 114 | 4 | 4              | -               | 204 | 286            | 221,6          |
| NJ432-M1        | -      | -                 | 1           | 63        | -                 | 160        | 400 | 88  | 5 | 5              | 8,3             | 226 | 314,9          | 247,2          |
| NJ432-M1        | -      | HJ432             | 1           | 63        | 5,33              | 160        | 400 | 88  | 5 | 5              | -               | 226 | 314,9          | 247,2          |
| NUP432-M1       | -      | -                 | 1           | 64,1      | -                 | 160        | 400 | 88  | 5 | 5              | -               | 226 | 314,9          | 247,2          |
| NJ334-E-MPA     | -      | -                 | 1           | 39        | -                 | 170        | 360 | 72  | 4 | 4              | 6               | 218 | 301,6          | 237            |
| NJ334-E-MPA     | -      | HJ334-E           | 1           | 39        | 3,21              | 170        | 360 | 72  | 4 | 4              | -               | 218 | 301,6          | 237            |
| NUP334-E-MPA    | -      | -                 | 1           | 39,6      | -                 | 170        | 360 | 72  | 4 | 4              | -               | 218 | 301,6          | 237            |
| NJ334-E-M1      | -      | -                 | 1           | 38,6      | -                 | 170        | 360 | 72  | 4 | 4              | 6               | 218 | 301,6          | 237            |
| NJ334-E-M1      | -      | HJ334-E           | 1           | 38,6      | 3,21              | 170        | 360 | 72  | 4 | 4              | -               | 218 | 301,6          | 237            |
| NUP334-E-M1     | -      | -                 | 1           | 39,2      | -                 | 170        | 360 | 72  | 4 | 4              | -               | 218 | 301,6          | 237            |
| NJ2334-EX-M1    | -      | -                 | 1           | 62,3      | -                 | 170        | 360 | 120 | 4 | 4              | 10,2            | 216 | 303            | 235,7          |
| NJ2334-EX-M1    | -      | HJ2334-EX         | 1           | 62,3      | 3,5               | 170        | 360 | 120 | 4 | 4              | -               | 216 | 303            | 235,7          |
| NJ2334-EX-M1A   | -      | -                 | 1           | 62,3      | -                 | 170        | 360 | 120 | 4 | 4              | 10,2            | 216 | 303            | 235,7          |
| NJ2334-EX-M1A   | -      | HJ2334-EX         | 1           | 62,3      | 3,5               | 170        | 360 | 120 | 4 | 4              | -               | 216 | 303            | 235,7          |
| NJ2334-EX-MP1A  | -      | -                 | 1           | 61,4      | -                 | 170        | 360 | 120 | 4 | 4              | 10,2            | 216 | 303            | 235,7          |
| NJ2334-EX-MP1A  | -      | HJ2334-EX         | 1           | 61,4      | 3,5               | 170        | 360 | 120 | 4 | 4              | -               | 216 | 303            | 235,7          |
| NUP2334-EX-M1   | -      | -                 | 1           | 62,9      | -                 | 170        | 360 | 120 | 4 | 4              | -               | 216 | 303            | 235,7          |
| NUP2334-EX-MP1A | -      | -                 | 1           | 62,3      | -                 | 170        | 360 | 120 | 4 | 4              | -               | 216 | 303            | 235,7          |
| NJ434-M1        | -      | -                 | 1           | 72,3      | -                 | 170        | 420 | 92  | 5 | 5              | 8,7             | 239 | 329,9          | 261,2          |
| NJ434-M1        | -      | HJ434             | 1           | 72,3      | 5,97              | 170        | 420 | 92  | 5 | 5              | -               | 239 | 329,9          | 261,2          |
| NUP434-M1       | -      | -                 | 1           | 73,7      | -                 | 170        | 420 | 92  | 5 | 5              | -               | 239 | 329,9          | 261,2          |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



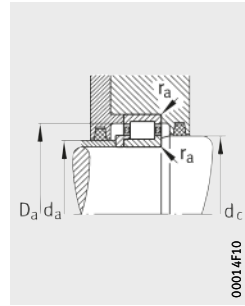
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2) Axial displacement "s" for NJ



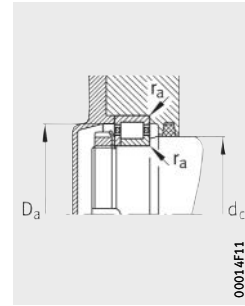
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Mounting dimensions for NJ



00014F10

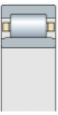
Mounting dimensions for NJ and HJ



00014F11

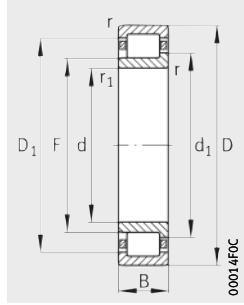
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |      |                |                |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed | Reference speed |
|----------------|----------------|----------------|---------------------|------|----------------|----------------|----------------|-----------------|---------------------|-----------------------|--------------------|----------------|-----------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub> | n <sub>B</sub>  |
|                |                |                | min. <sup>1)</sup>  | max. |                |                |                |                 |                     |                       |                    |                |                 |
| 15             | 25             | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 865                 | 1060                  | 114                | 3000           | 1770            |
| –              | –              | 10             | 177                 | 200  | 228            | 323            | 3              | 3               | 865                 | 1060                  | 114                | 3000           | 1770            |
| –              | –              | 10             | 177                 | 200  | 228            | 323            | 3              | 3               | 865                 | 1060                  | 114                | 3000           | 1770            |
| –              | –              | 10             | 177                 | 200  | 228            | 323            | 3              | 3               | 865                 | 1060                  | 114                | 3000           | 1800            |
| –              | –              | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1340            |
| 15             | 32             | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1340            |
| –              | –              | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1340            |
| 15             | 32             | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1340            |
| –              | –              | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1300            |
| 15             | 32             | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1300            |
| –              | –              | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1300            |
| 15             | 32             | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1300            |
| –              | –              | –              | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1300            |
| –              | –              | 17             | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1300            |
| –              | –              | 17             | 177                 | 200  | 228            | 323            | 3              | 3               | 1320                | 1830                  | 204                | 3000           | 1300            |
| –              | –              | –              | 184                 | 223  | 252            | 376            | 4              | 4               | 1060                | 1320                  | 142                | 2800           | 1500            |
| 20             | 37             | –              | 184                 | 223  | 252            | 376            | 4              | 4               | 1060                | 1320                  | 142                | 2800           | 1500            |
| –              | –              | 17             | 184                 | 223  | 252            | 376            | 4              | 4               | 1060                | 1320                  | 142                | 2800           | 1500            |
| –              | –              | –              | 187                 | 215  | 240            | 343            | 3              | 3               | 915                 | 1140                  | 123                | 3000           | 1700            |
| 16             | 27             | –              | 187                 | 215  | 240            | 343            | 3              | 3               | 915                 | 1140                  | 123                | 3000           | 1700            |
| –              | –              | 11             | 187                 | 215  | 240            | 343            | 3              | 3               | 915                 | 1140                  | 123                | 3000           | 1700            |
| –              | –              | –              | 187                 | 215  | 240            | 343            | 3              | 3               | 965                 | 1220                  | 132                | 3000           | 1610            |
| 16             | 27             | –              | 187                 | 215  | 240            | 343            | 3              | 3               | 965                 | 1220                  | 132                | 3000           | 1610            |
| 16             | 33,5           | –              | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 230                | 2800           | 1210            |
| –              | –              | –              | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 230                | 2800           | 1210            |
| 16             | 33,5           | –              | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 230                | 2800           | 1210            |
| –              | –              | –              | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 230                | 2800           | 1210            |
| 16             | 33,5           | –              | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 230                | 2800           | 1210            |
| –              | –              | 17,5           | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 231                | 2800           | 1200            |
| 16             | 33,5           | –              | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 230                | 2800           | 1210            |
| –              | –              | 17,5           | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 231                | 2800           | 1200            |
| –              | –              | 17,5           | 187                 | 214  | 238,3          | 343            | 3              | 3               | 1500                | 2080                  | 231                | 2800           | 1200            |
| –              | –              | –              | 194                 | 236  | 266            | 396            | 4              | 4               | 1120                | 1400                  | 151                | 2800           | 1500            |
| 20             | 38             | –              | 194                 | 236  | 266            | 396            | 4              | 4               | 1120                | 1400                  | 151                | 2800           | 1500            |
| –              | –              | 18             | 194                 | 236  | 266            | 396            | 4              | 4               | 1120                | 1400                  | 151                | 2800           | 1500            |

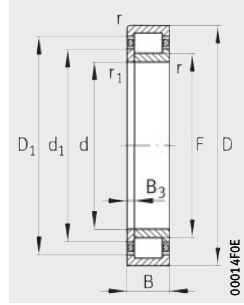


# Cylindrical roller bearings with cage

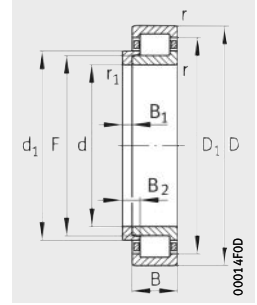
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing



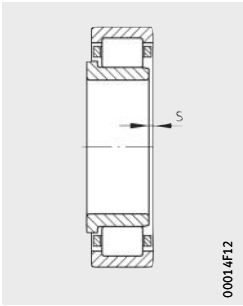
Design 1  
NJ and HJ  
Locating bearing

Dimension table (continued) · Dimensions in mm

| Designation     |        |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |     |      |      |                |                 |     |                |                |
|-----------------|--------|-------------------|-------------|----------------|--------------------------|------------|-----|------|------|----------------|-----------------|-----|----------------|----------------|
| Bearing         | X-life | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D   | B    | r    | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |
|                 |        |                   |             |                |                          |            |     | min. | min. |                |                 | ≈   | ≈              |                |
| NJ236-E-M1      | XL     | –                 | 1           | 19,2           | –                        | 180        | 320 | 52   | 4    | 4              | 4,7             | 217 | 278,6          | 230,2          |
| NJ236-E-M1      | XL     | HJ236-E           | 1           | 19,2           | 1,76                     | 180        | 320 | 52   | 4    | 4              | –               | 217 | 278,6          | 230,2          |
| NJ236-E-M1A     | XL     | –                 | 1           | 19,2           | –                        | 180        | 320 | 52   | 4    | 4              | 4,7             | 217 | 278,6          | 230,2          |
| NJ236-E-M1A     | XL     | HJ236-E           | 1           | 19,2           | 1,76                     | 180        | 320 | 52   | 4    | 4              | –               | 217 | 278,6          | 230,2          |
| NJ236-E-MP1A    | XL     | –                 | 1           | 19,1           | –                        | 180        | 320 | 52   | 4    | 4              | 4,7             | 217 | 278,6          | 230,2          |
| NJ236-E-MP1A    | XL     | HJ236-E           | 1           | 19,1           | 1,76                     | 180        | 320 | 52   | 4    | 4              | –               | 217 | 278,6          | 230,2          |
| NUP236-E-M1     | XL     | –                 | 1           | 17,3           | –                        | 180        | 320 | 52   | 4    | 4              | –               | 217 | 278,6          | 230,2          |
| NUP236-E-M1A    | XL     | –                 | 1           | 17,3           | –                        | 180        | 320 | 52   | 4    | 4              | –               | 217 | 278,6          | 230,2          |
| NUP236-E-MP1A   | XL     | –                 | 1           | 19,4           | –                        | 180        | 320 | 52   | 4    | 4              | –               | 217 | 278,6          | 230,2          |
| NUP236-E-MPA    | XL     | –                 | 1           | 19,4           | –                        | 180        | 320 | 52   | 4    | 4              | –               | 217 | 278,6          | 230,2          |
| NJ2236-E-M1     | XL     | –                 | 1           | 31,1           | –                        | 180        | 320 | 86   | 4    | 4              | 7,2             | 215 | 280            | 229            |
| NJ2236-E-M1     | XL     | HJ2236-E          | 1           | 31,1           | 1,87                     | 180        | 320 | 86   | 4    | 4              | –               | 215 | 280            | 229            |
| NUP2236-E-M1    | XL     | –                 | 1           | 31,6           | –                        | 180        | 320 | 86   | 4    | 4              | –               | 215 | 280            | 229            |
| NUP2236-E-M1A   | XL     | –                 | 1           | 31,6           | –                        | 180        | 320 | 86   | 4    | 4              | –               | 215 | 280            | 229            |
| NUP2236-E-MP1A  | XL     | –                 | 1           | 31,6           | –                        | 180        | 320 | 86   | 4    | 4              | –               | 215 | 280            | 229            |
| NUP2236-E-MPA   | XL     | –                 | 1           | 31,3           | –                        | 180        | 320 | 86   | 4    | 4              | –               | 215 | 280            | 229            |
| NJ336-E-M1      | –      | –                 | 1           | 44,6           | –                        | 180        | 380 | 75   | 4    | 4              | 6,1             | 231 | 319,8          | 250,5          |
| NJ336-E-M1      | –      | HJ336-E           | 1           | 44,6           | 3,77                     | 180        | 380 | 75   | 4    | 4              | –               | 231 | 319,8          | 250,5          |
| NJ336-E-M1A     | –      | –                 | 1           | 44,6           | –                        | 180        | 380 | 75   | 4    | 4              | 6,1             | 231 | 319,8          | 250,5          |
| NJ336-E-M1A     | –      | HJ336-E           | 1           | 44,6           | 3,77                     | 180        | 380 | 75   | 4    | 4              | –               | 231 | 319,8          | 250,5          |
| NJ336-E-MP1A    | –      | –                 | 1           | 44,6           | –                        | 180        | 380 | 75   | 4    | 4              | 6,1             | 231 | 319,8          | 250,5          |
| NJ336-E-MP1A    | –      | HJ336-E           | 1           | 44,6           | 3,77                     | 180        | 380 | 75   | 4    | 4              | –               | 231 | 319,8          | 250,5          |
| NUP336-E-M1     | –      | –                 | 1           | 45,3           | –                        | 180        | 380 | 75   | 4    | 4              | –               | 231 | 319,8          | 250,5          |
| NUP336-E-M1A    | –      | –                 | 1           | 45,3           | –                        | 180        | 380 | 75   | 4    | 4              | –               | 231 | 319,8          | 250,5          |
| NUP336-E-MPA    | –      | –                 | 1           | 45,3           | –                        | 180        | 380 | 75   | 4    | 4              | –               | 231 | 319,8          | 250,5          |
| NJ2336-EX-M1    | –      | –                 | 1           | 72,9           | –                        | 180        | 380 | 126  | 4    | 4              | 10,5            | 227 | 320,8          | 248            |
| NJ2336-EX-M1    | –      | HJ2336-EX         | 1           | 72,9           | 4,05                     | 180        | 380 | 126  | 4    | 4              | –               | 227 | 320,8          | 248            |
| NJ2336-EX-M1A   | –      | –                 | 1           | 72,9           | –                        | 180        | 380 | 126  | 4    | 4              | 10,5            | 227 | 320,8          | 248            |
| NJ2336-EX-M1A   | –      | HJ2336-EX         | 1           | 72,9           | 4,05                     | 180        | 380 | 126  | 4    | 4              | –               | 227 | 320,8          | 248            |
| NJ2336-EX-MP1A  | –      | –                 | 1           | 72             | –                        | 180        | 380 | 126  | 4    | 4              | 10,5            | 227 | 320,8          | 248            |
| NJ2336-EX-MP1A  | –      | HJ2336-EX         | 1           | 72             | 4,05                     | 180        | 380 | 126  | 4    | 4              | –               | 227 | 320,8          | 248            |
| NUP2336-EX-M1   | –      | –                 | 1           | 74             | –                        | 180        | 380 | 126  | 4    | 4              | –               | 227 | 320,8          | 248            |
| NUP2336-EX-M1A  | –      | –                 | 1           | 74             | –                        | 180        | 380 | 126  | 4    | 4              | –               | 227 | 320,8          | 248            |
| NUP2336-EX-MP1A | –      | –                 | 1           | 73,1           | –                        | 180        | 380 | 126  | 4    | 4              | –               | 227 | 320,8          | 248            |
| NUP2336-EX-MPA  | –      | –                 | 1           | 73,1           | –                        | 180        | 380 | 126  | 4    | 4              | –               | 227 | 320,8          | 248            |

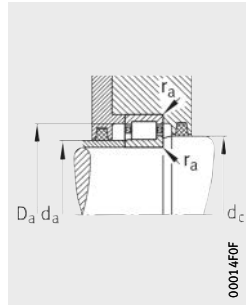
1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.





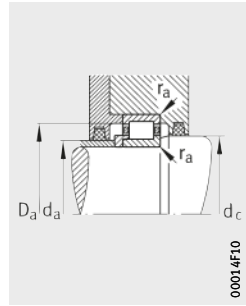
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2) Axial displacement "s" for NJ



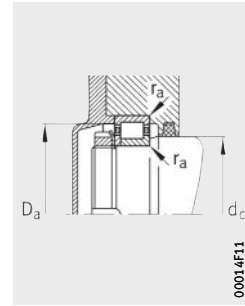
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Mounting dimensions for NJ



00014F10

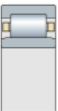
Mounting dimensions for NJ and HJ



00014F11

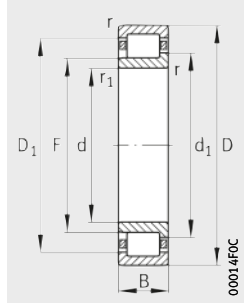
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed | Reference speed |
|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|----------------|-----------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub> | n <sub>B</sub>  |
|                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | kN              | kN                  | min <sup>-1</sup>     |                    |                |                 |
| -              | -              | -              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 850           |
| 12             | 20             | -              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 850           |
| -              | -              | -              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 850           |
| 12             | 20             | -              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 850           |
| -              | -              | -              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 900           |
| 12             | 20             | -              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 900           |
| -              | -              | 8              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 850           |
| -              | -              | 8              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 850           |
| -              | -              | 8              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 900           |
| -              | -              | 8              | 197                 | 214  | 233            | 303                | 3              | 3               | 730                 | 830                   | 112                | 3 600          | 1 900           |
| -              | -              | -              | 197                 | 214  | 233            | 303                | 3              | 3               | 1 180               | 1 490                 | 208                | 3 200          | 1 380           |
| 12             | 24             | -              | 197                 | 214  | 233            | 303                | 3              | 3               | 1 180               | 1 490                 | 208                | 3 200          | 1 380           |
| -              | -              | 12             | 197                 | 214  | 233            | 303                | 3              | 3               | 1 180               | 1 490                 | 208                | 3 200          | 1 380           |
| -              | -              | 12             | 197                 | 214  | 233            | 303                | 3              | 3               | 1 180               | 1 490                 | 208                | 3 200          | 1 380           |
| -              | -              | 12             | 197                 | 214  | 233            | 303                | 3              | 3               | 1 180               | 1 490                 | 208                | 3 200          | 1 400           |
| -              | -              | 12             | 197                 | 214  | 233            | 303                | 3              | 3               | 1 180               | 1 490                 | 208                | 3 200          | 1 400           |
| -              | -              | -              | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| 17             | 28,5           | -              | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| -              | -              | -              | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| 17             | 28,5           | -              | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| -              | -              | -              | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| 17             | 28,5           | -              | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| -              | -              | 11,5           | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| -              | -              | 11,5           | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| -              | -              | 11,5           | 197                 | 228  | 254            | 363                | 3              | 3               | 1 040               | 1 320                 | 141                | 2 800          | 1 500           |
| -              | -              | -              | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 120           |
| 17             | 35             | -              | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 120           |
| -              | -              | -              | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 120           |
| 17             | 35             | -              | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 120           |
| -              | -              | -              | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 100           |
| 17             | 35             | -              | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 100           |
| -              | -              | 18             | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 100           |
| -              | -              | 18             | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 100           |
| -              | -              | 18             | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 100           |
| -              | -              | 18             | 197                 | 225  | 250,6          | 363                | 3              | 3               | 1 660               | 2 320                 | 260                | 2 800          | 1 100           |

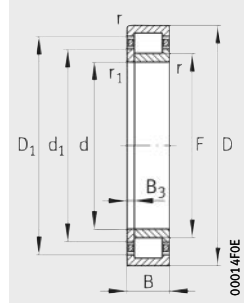


# Cylindrical roller bearings with cage

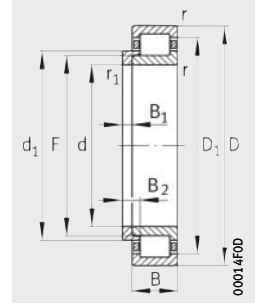
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

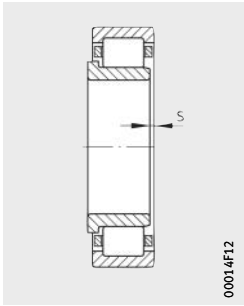


Design 1  
NJ and HJ  
Locating bearing

**Dimension table (continued)** · Dimensions in mm

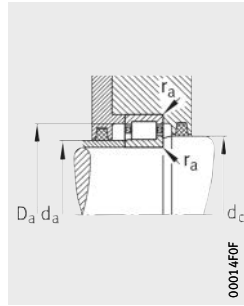
| Designation    |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |     |     |   |                |                 |     |                |                |   |
|----------------|-------------------|-------------|----------------|--------------------------|------------|-----|-----|---|----------------|-----------------|-----|----------------|----------------|---|
| Bearing        | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D   | B   | r | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |   |
|                |                   |             |                |                          |            |     |     |   |                |                 |     |                | ≈              | ≈ |
| NJ238-E-M1     | –                 | 1           | 23,2           | –                        | 190        | 340 | 55  | 4 | 4              | 4,7             | 230 | 295            | 244            |   |
| NJ238-E-M1     | HJ238-E           | 1           | 23,2           | 2,17                     | 190        | 340 | 55  | 4 | 4              | –               | 230 | 295            | 244            |   |
| NJ238-E-M1A    | –                 | 1           | 23,2           | –                        | 190        | 340 | 55  | 4 | 4              | 4,7             | 230 | 295            | 244            |   |
| NJ238-E-M1A    | HJ238-E           | 1           | 23,2           | 2,17                     | 190        | 340 | 55  | 4 | 4              | –               | 230 | 295            | 244            |   |
| NUP238-E-M1    | –                 | 1           | 23,5           | –                        | 190        | 340 | 55  | 4 | 4              | –               | 230 | 295            | 244            |   |
| NJ2238-E-M1    | –                 | 1           | 37,7           | –                        | 190        | 340 | 92  | 4 | 4              | 8               | 228 | 296,4          | 242,7          |   |
| NJ2238-E-M1    | HJ2238-E          | 1           | 37,7           | 2,31                     | 190        | 340 | 92  | 4 | 4              | –               | 228 | 296,4          | 242,7          |   |
| NUP2238-E-M1   | –                 | 1           | 38,3           | –                        | 190        | 340 | 92  | 4 | 4              | –               | 228 | 296,4          | 242,7          |   |
| NUP2238-E-M1A  | –                 | 1           | 38,3           | –                        | 190        | 340 | 92  | 4 | 4              | –               | 228 | 296,4          | 242,7          |   |
| NJ338-E-M1     | –                 | 1           | 51,4           | –                        | 190        | 400 | 78  | 5 | 5              | 6,3             | 245 | 336            | 265,4          |   |
| NJ338-E-M1A    | –                 | 1           | 51,4           | –                        | 190        | 400 | 78  | 5 | 5              | 6,3             | 245 | 336            | 265,4          |   |
| NUP338-E-M1    | –                 | 1           | 52,2           | –                        | 190        | 400 | 78  | 5 | 5              | –               | 245 | 336            | 265,4          |   |
| NUP338-E-M1A   | –                 | 1           | 52,2           | –                        | 190        | 400 | 78  | 5 | 5              | –               | 245 | 336            | 265,4          |   |
| NJ2338-EX-M1   | –                 | 1           | 84,4           | –                        | 190        | 400 | 132 | 5 | 5              | 11              | 240 | 340,5          | 262,5          |   |
| NJ2338-EX-M1   | HJ2338-EX         | 1           | 84,4           | 4,8                      | 190        | 400 | 132 | 5 | 5              | –               | 240 | 340,5          | 262,5          |   |
| NJ2338-EX-MP1A | –                 | 1           | 86,3           | –                        | 190        | 400 | 132 | 5 | 5              | 11              | 240 | 340,5          | 262,5          |   |
| NJ2338-EX-MP1A | HJ2338-EX         | 1           | 86,3           | 4,8                      | 190        | 400 | 132 | 5 | 5              | –               | 240 | 340,5          | 262,5          |   |
| NUP2338-EX-M1  | –                 | 1           | 85,7           | –                        | 190        | 400 | 132 | 5 | 5              | –               | 240 | 340,5          | 262,5          |   |
| NJ438-M1       | –                 | 1           | 71,2           | –                        | 190        | 460 | 98  | 6 | 6              | 9,4             | 165 | 361,9          | 289,2          |   |
| NJ438-M1       | HJ438             | 1           | 71,2           | 8,14                     | 190        | 460 | 98  | 6 | 6              | –               | 165 | 361,9          | 289,2          |   |
| NJ240-E-M1     | –                 | 1           | 27,5           | –                        | 200        | 360 | 58  | 4 | 4              | 4,8             | 243 | 311,5          | 257,6          |   |
| NJ240-E-M1     | HJ240-E           | 1           | 27,5           | 2,62                     | 200        | 360 | 58  | 4 | 4              | –               | 243 | 311,5          | 257,6          |   |
| NJ240-E-M1A    | –                 | 1           | 27,5           | –                        | 200        | 360 | 58  | 4 | 4              | 4,8             | 243 | 311,5          | 257,6          |   |
| NJ240-E-M1A    | HJ240-E           | 1           | 27,5           | 2,62                     | 200        | 360 | 58  | 4 | 4              | –               | 243 | 311,5          | 257,6          |   |
| NJ240-E-MP1A   | –                 | 1           | 27,5           | –                        | 200        | 360 | 58  | 4 | 4              | 4,8             | 243 | 311,5          | 257,6          |   |
| NJ240-E-MP1A   | HJ240-E           | 1           | 27,5           | 2,62                     | 200        | 360 | 58  | 4 | 4              | –               | 243 | 311,5          | 257,6          |   |
| NUP240-E-M1    | –                 | 1           | 28             | –                        | 200        | 360 | 58  | 4 | 4              | –               | 243 | 311,5          | 257,6          |   |
| NUP240-E-M1A   | –                 | 1           | 28             | –                        | 200        | 360 | 58  | 4 | 4              | –               | 243 | 311,5          | 257,6          |   |
| NUP240-E-MPA   | –                 | 1           | 27,9           | –                        | 200        | 360 | 58  | 4 | 4              | –               | 243 | 311,5          | 257,6          |   |
| NJ2240-E-M1    | –                 | 1           | 45,3           | –                        | 200        | 360 | 98  | 4 | 4              | 8,2             | 241 | 312,9          | 256,3          |   |
| NJ2240-E-M1    | HJ2240-E          | 1           | 45,3           | 2,78                     | 200        | 360 | 98  | 4 | 4              | –               | 241 | 312,9          | 256,3          |   |
| NJ2240-E-M1A   | –                 | 1           | 45,3           | –                        | 200        | 360 | 98  | 4 | 4              | 8,2             | 241 | 312,9          | 256,3          |   |
| NJ2240-E-M1A   | HJ2240-E          | 1           | 45,3           | 2,78                     | 200        | 360 | 98  | 4 | 4              | –               | 241 | 312,9          | 256,3          |   |
| NUP2240-E-M1   | –                 | 1           | 46             | –                        | 200        | 360 | 98  | 4 | 4              | –               | 241 | 312,9          | 256,3          |   |
| NUP2240-E-M1A  | –                 | 1           | 46             | –                        | 200        | 360 | 98  | 4 | 4              | –               | 241 | 312,9          | 256,3          |   |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



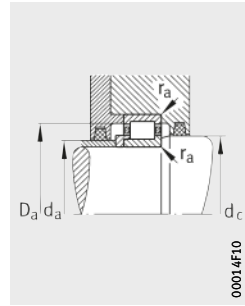
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2) Axial displacement "s" for NJ



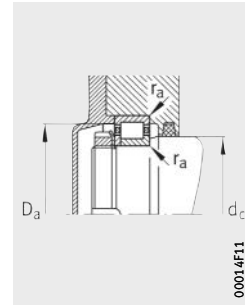
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Mounting dimensions for NJ



00014F10

Mounting dimensions for NJ and HJ



00014F11

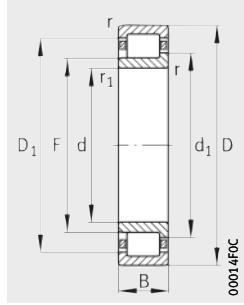
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |       |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed | Reference speed |
|----------------|----------------|----------------|---------------------|-------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|----------------|-----------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |       | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub> | n <sub>B</sub>  |
|                |                |                | min. <sup>1)</sup>  | max.  | min.           | max. <sup>1)</sup> | max.           | max.            | max.                | kN                    |                    |                |                 |
| -              | -              | -              | 207                 | 227   | 247            | 323                | 3              | 3               | 680                 | 930                   | 100                | 3 200          | 1 720           |
| 13             | 21,5           | -              | 207                 | 227   | 247            | 323                | 3              | 3               | 680                 | 930                   | 100                | 3 200          | 1 720           |
| -              | -              | -              | 207                 | 227   | 247            | 323                | 3              | 3               | 680                 | 930                   | 100                | 3 200          | 1 720           |
| 13             | 21,5           | -              | 207                 | 227   | 247            | 323                | 3              | 3               | 680                 | 930                   | 100                | 3 200          | 1 720           |
| -              | -              | 8,5            | 207                 | 227   | 247            | 323                | 3              | 3               | 680                 | 930                   | 100                | 3 200          | 1 720           |
| -              | -              | -              | 207                 | 227   | 247            | 323                | 3              | 3               | 1 100               | 1 660                 | 184                | 3 000          | 1 290           |
| 13             | 26,5           | -              | 207                 | 227   | 247            | 323                | 3              | 3               | 1 100               | 1 660                 | 184                | 3 000          | 1 290           |
| -              | -              | 13,5           | 207                 | 227   | 247            | 323                | 3              | 3               | 1 100               | 1 660                 | 183                | 3 000          | 1 290           |
| -              | -              | 13,5           | 207                 | 227   | 247            | 323                | 3              | 3               | 1 100               | 1 660                 | 183                | 3 000          | 1 290           |
| -              | -              | -              | 210                 | 242   | 269            | 380                | 4              | 4               | 1 120               | 1 430                 | 151                | 2 800          | 1 400           |
| -              | -              | -              | 210                 | 242   | 269            | 380                | 4              | 4               | 1 120               | 1 430                 | 151                | 2 800          | 1 400           |
| -              | -              | 12             | 210                 | 242   | 269            | 380                | 4              | 4               | 1 120               | 1 430                 | 151                | 2 800          | 1 400           |
| -              | -              | 12             | 210                 | 242   | 269            | 380                | 4              | 4               | 1 120               | 1 430                 | 151                | 2 800          | 1 400           |
| -              | -              | -              | 210                 | 237,8 | 265,3          | 380                | 4              | 4               | 1 900               | 2 650                 | 285                | 2 600          | 1 010           |
| 18             | 36,5           | -              | 210                 | 237,8 | 265,3          | 380                | 4              | 4               | 1 900               | 2 650                 | 285                | 2 600          | 1 010           |
| -              | -              | -              | 210                 | 237,8 | 265,3          | 380                | 4              | 4               | 1 900               | 2 650                 | 285                | 2 600          | 1 000           |
| 18             | 36,5           | -              | 210                 | 237,8 | 265,3          | 380                | 4              | 4               | 1 900               | 2 650                 | 285                | 2 600          | 1 000           |
| -              | -              | 18,8           | 210                 | 237,8 | 265,3          | 380                | 4              | 4               | 1 900               | 2 650                 | 285                | 2 600          | 1 000           |
| -              | -              | -              | 220                 | 262   | 294            | 430                | 5              | 5               | 1 340               | 1 760                 | 181                | 2 600          | 1 200           |
| 23             | 42             | -              | 220                 | 262   | 294            | 430                | 5              | 5               | 1 340               | 1 760                 | 181                | 2 600          | 1 200           |
| -              | -              | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| 14             | 23             | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| -              | -              | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| 14             | 23             | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| -              | -              | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| 14             | 23             | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| -              | -              | 9              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| -              | -              | 9              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| -              | -              | 9              | 217                 | 240   | 261            | 343                | 3              | 3               | 750                 | 1 040                 | 110                | 3 000          | 1 600           |
| -              | -              | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 1 220               | 1 860                 | 206                | 2 800          | 1 180           |
| 14             | 28             | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 1 220               | 1 860                 | 206                | 2 800          | 1 180           |
| -              | -              | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 1 220               | 1 860                 | 206                | 2 800          | 1 180           |
| 14             | 28             | -              | 217                 | 240   | 261            | 343                | 3              | 3               | 1 220               | 1 860                 | 206                | 2 800          | 1 180           |
| -              | -              | 14             | 217                 | 240   | 261            | 343                | 3              | 3               | 1 220               | 1 860                 | 205                | 2 800          | 1 200           |
| -              | -              | 14             | 217                 | 240   | 261            | 343                | 3              | 3               | 1 220               | 1 860                 | 205                | 2 800          | 1 200           |

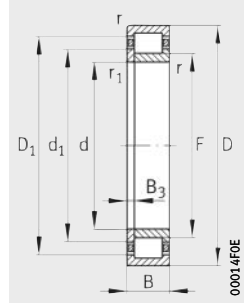


# Cylindrical roller bearings with cage

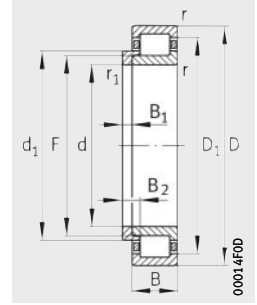
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

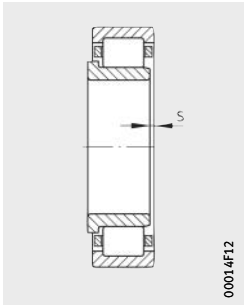


Design 1  
NJ and HJ  
Locating bearing

Dimension table (continued) · Dimensions in mm

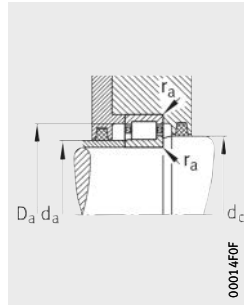
| Designation     |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |     |      |      |                |                 |     |                |                |
|-----------------|-------------------|-------------|----------------|--------------------------|------------|-----|------|------|----------------|-----------------|-----|----------------|----------------|
| Bearing         | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D   | B    | r    | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |
|                 |                   |             |                |                          |            |     | min. | min. |                |                 | ≈   | ≈              |                |
| NUP2240-E-MP1A  | –                 | 1           | 45,6           | –                        | 200        | 360 | 98   | 4    | 4              | –               | 241 | 312,9          | 256,3          |
| NUP2240-E-MPA   | –                 | 1           | 45,6           | –                        | 200        | 360 | 98   | 4    | 4              | –               | 241 | 312,9          | 256,3          |
| NJ340-E-M1      | –                 | 1           | 58,1           | –                        | 200        | 420 | 80   | 5    | 5              | 6,3             | 258 | 351,8          | 279            |
| NJ340-E-M1      | HJ340-E           | 1           | 58,1           | 4,94                     | 200        | 420 | 80   | 5    | 5              | –               | 258 | 351,8          | 279            |
| NJ340-E-M1A     | –                 | 1           | 58,1           | –                        | 200        | 420 | 80   | 5    | 5              | 6,3             | 258 | 351,8          | 279            |
| NJ340-E-M1A     | HJ340-E           | 1           | 58,1           | 4,94                     | 200        | 420 | 80   | 5    | 5              | –               | 258 | 351,8          | 279            |
| NUP340-E-M1     | –                 | 1           | 59             | –                        | 200        | 420 | 80   | 5    | 5              | –               | 258 | 351,8          | 279            |
| NUP340-E-M1A    | –                 | 1           | 59             | –                        | 200        | 420 | 80   | 5    | 5              | –               | 258 | 351,8          | 279            |
| NJ2340-EX-M1    | –                 | 1           | 97,2           | –                        | 200        | 420 | 138  | 5    | 5              | 11,3            | 253 | 356,9          | 276,1          |
| NJ2340-EX-M1    | HJ2340-EX         | 1           | 97,2           | 5,28                     | 200        | 420 | 138  | 5    | 5              | –               | 253 | 356,9          | 276,1          |
| NJ2340-EX-M1A   | –                 | 1           | 97,2           | –                        | 200        | 420 | 138  | 5    | 5              | 11,3            | 253 | 356,9          | 276,1          |
| NJ2340-EX-M1A   | HJ2340-EX         | 1           | 97,2           | 5,28                     | 200        | 420 | 138  | 5    | 5              | –               | 253 | 356,9          | 276,1          |
| NUP2340-EX-M1   | –                 | 1           | 98,7           | –                        | 200        | 420 | 138  | 5    | 5              | –               | 253 | 356,9          | 276,1          |
| NUP2340-EX-M1A  | –                 | 1           | 98,7           | –                        | 200        | 420 | 138  | 5    | 5              | –               | 253 | 356,9          | 276,1          |
| NUP2340-EX-MP1A | –                 | 1           | 97             | –                        | 200        | 420 | 138  | 5    | 5              | –               | 253 | 356,9          | 276,1          |
| NJ440-M1        | –                 | 1           | 104            | –                        | 200        | 480 | 102  | 6    | 6              | 9,4             | 276 | 378,9          | 301,1          |
| NJ440-M1        | HJ440             | 1           | 104            | 9,02                     | 200        | 480 | 102  | 6    | 6              | –               | 276 | 378,9          | 301,1          |
| NJ1044-M1       | –                 | 1           | 20,9           | –                        | 220        | 340 | 56   | 3    | 3              | 6,2             | 250 | 298,9          | 261,7          |
| NJ1044-M1       | HJ1044            | 1           | 20,9           | 2,13                     | 220        | 340 | 56   | 3    | 3              | –               | 250 | 298,9          | 261,7          |
| NJ1044-M1A      | –                 | 1           | 20,9           | –                        | 220        | 340 | 56   | 3    | 3              | 6,2             | 250 | 298,9          | 261,7          |
| NJ1044-M1A      | HJ1044            | 1           | 20,9           | 2,13                     | 220        | 340 | 56   | 3    | 3              | –               | 250 | 298,9          | 261,7          |
| NJ244-E-M1      | –                 | 1           | 38,7           | –                        | 220        | 400 | 65   | 4    | 4              | 5,5             | 268 | 344,9          | 285,2          |
| NJ244-E-M1      | HJ244-E           | 1           | 38,7           | 3,55                     | 220        | 400 | 65   | 4    | 4              | –               | 268 | 344,9          | 285,2          |
| NUP244-E-M1     | –                 | 1           | 39,3           | –                        | 220        | 400 | 65   | 4    | 4              | –               | 268 | 344,9          | 285,2          |
| NUP244-E-M1A    | –                 | 1           | 39,3           | –                        | 220        | 400 | 65   | 4    | 4              | –               | 268 | 344,9          | 285,2          |
| NJ2244-EX-M1    | –                 | 1           | 62,5           | –                        | 220        | 400 | 108  | 4    | 4              | 8,4             | 259 | 349,4          | 279,4          |
| NJ2244-EX-M1    | HJ2244-EX         | 1           | 62,5           | 3,58                     | 220        | 400 | 108  | 4    | 4              | –               | 259 | 349,4          | 279,4          |
| NJ2244-EX-M1A   | –                 | 1           | 62,5           | –                        | 220        | 400 | 108  | 4    | 4              | 8,4             | 259 | 349,4          | 279,4          |
| NJ2244-EX-M1A   | HJ2244-EX         | 1           | 62,5           | 3,58                     | 220        | 400 | 108  | 4    | 4              | –               | 259 | 349,4          | 279,4          |
| NJ2244-EX-MP1A  | –                 | 1           | 61,3           | –                        | 220        | 400 | 108  | 4    | 4              | 8,4             | 259 | 349,4          | 279,4          |
| NJ2244-EX-MP1A  | HJ2244-EX         | 1           | 61,3           | 3,58                     | 220        | 400 | 108  | 4    | 4              | –               | 259 | 349,4          | 279,4          |
| NUP2244-EX-M1   | –                 | 1           | 63,4           | –                        | 220        | 400 | 108  | 4    | 4              | –               | 259 | 349,4          | 279,4          |
| NUP2244-EX-M1A  | –                 | 1           | 63,4           | –                        | 220        | 400 | 108  | 4    | 4              | –               | 259 | 349,4          | 279,4          |
| NUP2244-EX-MP1A | –                 | 1           | 62,2           | –                        | 220        | 400 | 108  | 4    | 4              | –               | 259 | 349,4          | 279,4          |
| NJ344-E-M1      | –                 | 1           | 76,6           | –                        | 220        | 460 | 88   | 5    | 5              | 7               | 282 | 386            | 305,1          |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



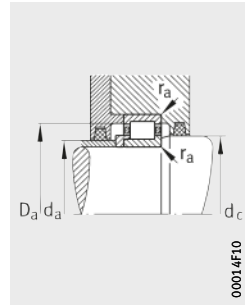
00014F12

2) Axial displacement "s" for NJ



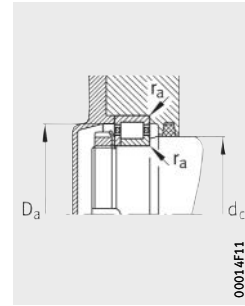
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Mounting dimensions for NJ



00014F10

Mounting dimensions for NJ and HJ



00014F11

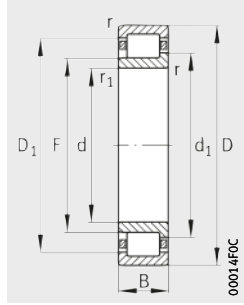
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |       |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed | Reference speed |
|----------------|----------------|----------------|---------------------|-------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|----------------|-----------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |       | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub> | n <sub>B</sub>  |
|                |                |                | min. <sup>1)</sup>  | max.  | min.           | max. <sup>1)</sup> | max.           | max.            | max.                | kN                    |                    |                |                 |
| -              | -              | 14             | 217                 | 240   | 261            | 343                | 3              | 3               | 1 220               | 1 860                 | 205                | 2 800          | 1 200           |
| -              | -              | 14             | 217                 | 240   | 261            | 343                | 3              | 3               | 1 220               | 1 860                 | 205                | 2 800          | 1 200           |
| -              | -              | -              | 220                 | 255   | 282            | 400                | 4              | 4               | 1 180               | 1 530                 | 161                | 2 600          | 1 320           |
| 18             | 30             | -              | 220                 | 255   | 282            | 400                | 4              | 4               | 1 180               | 1 530                 | 161                | 2 600          | 1 320           |
| -              | -              | -              | 220                 | 255   | 282            | 400                | 4              | 4               | 1 180               | 1 530                 | 161                | 2 600          | 1 320           |
| 18             | 30             | -              | 220                 | 255   | 282            | 400                | 4              | 4               | 1 180               | 1 530                 | 161                | 2 600          | 1 320           |
| -              | -              | 12             | 220                 | 255   | 282            | 400                | 4              | 4               | 1 180               | 1 530                 | 161                | 2 600          | 1 300           |
| -              | -              | 12             | 220                 | 255   | 282            | 400                | 4              | 4               | 1 180               | 1 530                 | 161                | 2 600          | 1 300           |
| -              | -              | -              | 220                 | 250,7 | 279            | 400                | 4              | 4               | 2 040               | 2 900                 | 310                | 2 400          | 940             |
| 18             | 37             | -              | 220                 | 250,7 | 279            | 400                | 4              | 4               | 2 040               | 2 900                 | 310                | 2 400          | 940             |
| -              | -              | -              | 220                 | 250,7 | 279            | 400                | 4              | 4               | 2 040               | 2 900                 | 310                | 2 400          | 940             |
| 18             | 37             | -              | 220                 | 250,7 | 279            | 400                | 4              | 4               | 2 040               | 2 900                 | 310                | 2 400          | 940             |
| -              | -              | 19             | 220                 | 250,7 | 279            | 400                | 4              | 4               | 2 040               | 2 900                 | 310                | 2 400          | 950             |
| -              | -              | 19             | 220                 | 250,7 | 279            | 400                | 4              | 4               | 2 040               | 2 900                 | 310                | 2 400          | 950             |
| -              | -              | 19             | 220                 | 250,7 | 279            | 400                | 4              | 4               | 2 040               | 2 900                 | 310                | 2 400          | 950             |
| -              | -              | -              | 230                 | 273   | 306            | 450                | 5              | 5               | 1 460               | 1 860                 | 190                | 2 400          | 1 200           |
| 24             | 43             | -              | 230                 | 273   | 306            | 450                | 5              | 5               | 1 460               | 1 860                 | 190                | 2 400          | 1 200           |
| -              | -              | -              | 232                 | 248   | 265            | 328                | 2,5            | 2,5             | 510                 | 765                   | 80                 | 3 200          | 2 000           |
| 14             | 27             | -              | 232                 | 248   | 265            | 328                | 2,5            | 2,5             | 510                 | 765                   | 80                 | 3 200          | 2 000           |
| -              | -              | -              | 232                 | 248   | 265            | 328                | 2,5            | 2,5             | 510                 | 765                   | 80                 | 3 200          | 2 000           |
| 14             | 27             | -              | 232                 | 248   | 265            | 328                | 2,5            | 2,5             | 510                 | 765                   | 80                 | 3 200          | 2 000           |
| -              | -              | -              | 237                 | 265   | 288            | 383                | 3              | 3               | 950                 | 1 320                 | 134                | 2 800          | 1 380           |
| 15             | 25             | -              | 237                 | 265   | 288            | 383                | 3              | 3               | 950                 | 1 320                 | 134                | 2 800          | 1 380           |
| -              | -              | 10             | 237                 | 265   | 288            | 383                | 3              | 3               | 950                 | 1 320                 | 135                | 2 800          | 1 380           |
| -              | -              | 10             | 237                 | 265   | 288            | 383                | 3              | 3               | 950                 | 1 320                 | 135                | 2 800          | 1 380           |
| -              | -              | -              | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| 15             | 29             | -              | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| -              | -              | -              | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| 15             | 29             | -              | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| -              | -              | -              | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| 15             | 29             | -              | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| -              | -              | 14             | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| -              | -              | 14             | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| -              | -              | 14             | 237                 | 256,7 | 282,3          | 383                | 3              | 3               | 1 630               | 2 360                 | 250                | 2 600          | 1 000           |
| -              | -              | -              | 240                 | 279   | 308            | 440                | 4              | 4               | 1 430               | 1 900                 | 192                | 2 400          | 1 140           |

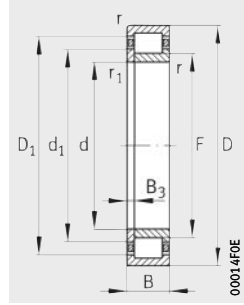


# Cylindrical roller bearings with cage

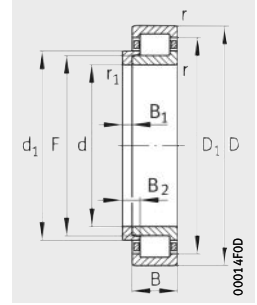
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

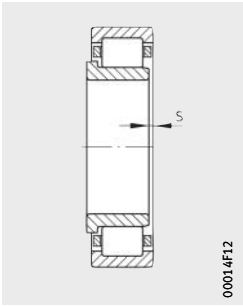


Design 1  
NJ and HJ  
Locating bearing

**Dimension table** (continued) · Dimensions in mm

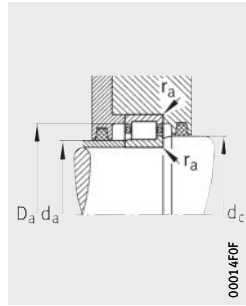
| Designation    |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |     |      |      |                |                 |     |                |                |
|----------------|-------------------|-------------|----------------|--------------------------|------------|-----|------|------|----------------|-----------------|-----|----------------|----------------|
| Bearing        | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D   | B    | r    | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |
|                |                   |             |                |                          |            |     | min. | min. |                |                 | ≈   | ≈              |                |
| NUP344-E-M1    | –                 | 1           | 77,7           | –                        | 220        | 460 | 88   | 5    | 5              | –               | 282 | 386            | 305,1          |
| NJ2344-EX-M1   | –                 | 1           | 122            | –                        | 220        | 460 | 145  | 5    | 5              | 11,9            | 277 | 391,2          | 302,2          |
| NJ2344-EX-M1   | HJ2344-EX         | 1           | 122            | 6,93                     | 220        | 460 | 145  | 5    | 5              | –               | 277 | 391,2          | 302,2          |
| NUP2344-EX-M1  | –                 | 1           | 124            | –                        | 220        | 460 | 145  | 5    | 5              | –               | 277 | 391,2          | 302,2          |
| NUP2344-EX-M1A | –                 | 1           | 124            | –                        | 220        | 460 | 145  | 5    | 5              | –               | 277 | 391,2          | 302,2          |
| NJ444-M1       | –                 | 1           | 153            | –                        | 220        | 540 | 115  | 6    | 6              | 10              | 305 | 426,1          | 335,1          |
| NJ444-M1       | HJ444             | 1           | 153            | 12,4                     | 220        | 540 | 115  | 6    | 6              | –               | 305 | 426,1          | 335,1          |
| NJ1948-MP1A    | –                 | 1           | 8,9            | –                        | 240        | 320 | 38   | 2,1  | 1,5            | 4,6             | 261 | 292,6          | 267,4          |
| NJ1948-MP1A    | HJ1948            | 1           | 8,9            | 1,2                      | 240        | 320 | 38   | 2,1  | 1,5            | –               | 261 | 292,6          | 267,4          |
| NJ1048-M1      | –                 | 1           | 20,4           | –                        | 240        | 360 | 56   | 3    | 3              | 6,4             | 270 | 318,9          | 281,6          |
| NJ1048-M1      | HJ1048            | 1           | 20,4           | 2,29                     | 240        | 360 | 56   | 3    | 3              | –               | 270 | 318,9          | 281,6          |
| NJ1048-M1A     | –                 | 1           | 20,4           | –                        | 240        | 360 | 56   | 3    | 3              | 6,4             | 270 | 318,9          | 281,6          |
| NJ1048-M1A     | HJ1048            | 1           | 20,4           | 2,29                     | 240        | 360 | 56   | 3    | 3              | –               | 270 | 318,9          | 281,6          |
| NJ248-E-M1     | –                 | 1           | 52,5           | –                        | 240        | 440 | 72   | 4    | 4              | 6               | 293 | 376,6          | 312            |
| NJ248-E-M1     | HJ248-E           | 1           | 52,5           | 4,6                      | 240        | 440 | 72   | 4    | 4              | –               | 293 | 376,6          | 312            |
| NUP248-E-M1    | –                 | 1           | 53,3           | –                        | 240        | 440 | 72   | 4    | 4              | –               | 293 | 376,6          | 312            |
| NUP248-E-M1A   | –                 | 1           | 53,3           | –                        | 240        | 440 | 72   | 4    | 4              | –               | 293 | 376,6          | 312            |
| NJ2248-EX-M1   | –                 | 1           | 84,2           | –                        | 240        | 440 | 120  | 4    | 4              | 10,2            | 287 | 380,7          | 308            |
| NJ2248-EX-M1   | HJ2248-EX         | 1           | 84,2           | 4,9                      | 240        | 440 | 120  | 4    | 4              | –               | 287 | 380,7          | 308            |
| NJ2248-EX-M1A  | –                 | 1           | 84,2           | –                        | 240        | 440 | 120  | 4    | 4              | 10,2            | 287 | 380,7          | 308            |
| NJ2248-EX-M1A  | HJ2248-EX         | 1           | 84,2           | 4,9                      | 240        | 440 | 120  | 4    | 4              | –               | 287 | 380,7          | 308            |
| NUP2248-EX-M1  | –                 | 1           | 85,6           | –                        | 240        | 440 | 120  | 4    | 4              | –               | 287 | 380,7          | 308            |
| NUP2248-EX-M1A | –                 | 1           | 85,6           | –                        | 240        | 440 | 120  | 4    | 4              | –               | 287 | 380,7          | 308            |
| NJ348-E-M1     | –                 | 1           | 97             | –                        | 240        | 500 | 95   | 5    | 5              | 7,4             | 306 | 421,2          | 331,3          |
| NJ348-E-M1     | HJ348-E           | 1           | 97             | 8,3                      | 240        | 500 | 95   | 5    | 5              | –               | 306 | 421,2          | 331,3          |
| NJ2348-EX-M1   | –                 | 1           | 154            | –                        | 240        | 500 | 155  | 5    | 5              | 13,3            | 303 | 424            | 329,6          |
| NJ2348-EX-M1   | HJ2348-EX         | 1           | 154            | 9,04                     | 240        | 500 | 155  | 5    | 5              | –               | 303 | 424            | 329,6          |
| NUP2348-EX-M1  | –                 | 1           | 154            | –                        | 240        | 500 | 155  | 5    | 5              | –               | 303 | 424            | 329,6          |
| NJ448-M1       | –                 | 1           | 176            | –                        | 240        | 580 | 122  | 6    | 6              | 10,9            | 330 | 459,1          | 363,1          |
| NJ448-M1       | HJ448             | 1           | 176            | 15,6                     | 240        | 580 | 122  | 6    | 6              | –               | 330 | 459,1          | 363,1          |
| NJ2852-M1      | –                 | 1           | 6,42           | –                        | 260        | 320 | 36   | 2    | 1,1            | 3,8             | 275 | 300,6          | 281,5          |
| NUP2852-M1     | –                 | 1           | 6,51           | –                        | 260        | 320 | 36   | 2    | 1,1            | –               | 275 | 300,6          | 280,6          |

<sup>1)</sup> Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



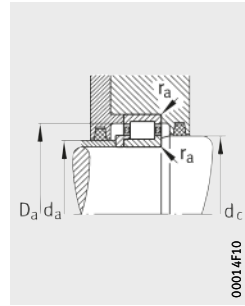
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2) Axial displacement "s" for NJ



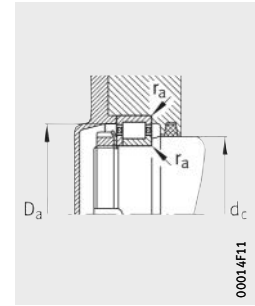
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Mounting dimensions for NJ



00014F10

Mounting dimensions for NJ and HJ



00014F11

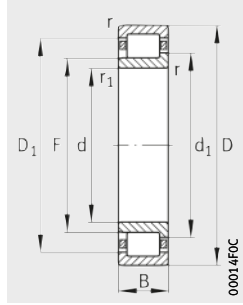
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |       |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|---------------------|-------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |       | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
|                |                |                | min. <sup>1)</sup>  | max.  | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| -              | -              | 13             | 240                 | 279   | 308            | 440                | 4              | 4               | 1 430               | 1 900                 | 192                | 2 400             | 1 100             |
| -              | -              | -              | 240                 | 276   | 306            | 440                | 4              | 4               | 2 360               | 3 350                 | 340                | 2 200             | 830               |
| 20             | 40             | -              | 240                 | 276   | 306            | 440                | 4              | 4               | 2 360               | 3 350                 | 340                | 2 200             | 830               |
| -              | -              | 20             | 240                 | 274,7 | 305,1          | 440                | 4              | 4               | 2 360               | 3 350                 | 340                | 2 200             | 830               |
| -              | -              | 20             | 240                 | 274,7 | 305,1          | 440                | 4              | 4               | 2 360               | 3 350                 | 340                | 2 200             | 830               |
| -              | -              | -              | 250                 | 302   | 340            | 510                | 5              | 5               | 1 960               | 2 550                 | 249                | 2 200             | 950               |
| 26             | 46             | -              | 250                 | 302   | 340            | 510                | 5              | 5               | 1 960               | 2 550                 | 249                | 2 200             | 950               |
| -              | -              | -              | 248                 | 258   | 272            | 309                | 2              | 1,5             | 330                 | 490                   | 50                 | 3 800             | -                 |
| 12             | 21,5           | -              | 248                 | 258   | 272            | 309                | 2              | 1,5             | 330                 | 490                   | 50                 | 3 800             | -                 |
| -              | -              | -              | 252                 | 268   | 285            | 348                | 2,5            | 2,5             | 540                 | 850                   | 74                 | 3 000             | 1 800             |
| 14             | 27             | -              | 252                 | 268   | 285            | 348                | 2,5            | 2,5             | 540                 | 850                   | 74                 | 3 000             | 1 800             |
| -              | -              | -              | 252                 | 268   | 285            | 348                | 2,5            | 2,5             | 540                 | 850                   | 64                 | 3 000             | 1 800             |
| 14             | 27             | -              | 252                 | 268   | 285            | 348                | 2,5            | 2,5             | 540                 | 850                   | 64                 | 3 000             | 1 800             |
| -              | -              | -              | 257                 | 290   | 315            | 423                | 3              | 3               | 1 140               | 1 600                 | 163                | 2 600             | 1 220             |
| 16             | 27             | -              | 257                 | 290   | 315            | 423                | 3              | 3               | 1 140               | 1 600                 | 163                | 2 600             | 1 220             |
| -              | -              | 11             | 257                 | 290   | 315            | 423                | 3              | 3               | 1 140               | 1 600                 | 163                | 2 600             | 1 200             |
| -              | -              | 11             | 257                 | 290   | 315            | 423                | 3              | 3               | 1 140               | 1 600                 | 163                | 2 600             | 1 200             |
| -              | -              | -              | 257                 | 284,5 | 311,1          | 423                | 3              | 3               | 1 830               | 2 800                 | 290                | 2 400             | 900               |
| 16             | 33,5           | -              | 257                 | 284,5 | 311,1          | 423                | 3              | 3               | 1 830               | 2 800                 | 290                | 2 400             | 900               |
| -              | -              | -              | 257                 | 284,5 | 311,1          | 423                | 3              | 3               | 1 830               | 2 800                 | 290                | 2 400             | 900               |
| 16             | 33,5           | -              | 257                 | 284,5 | 311,1          | 423                | 3              | 3               | 1 830               | 2 800                 | 290                | 2 400             | 900               |
| -              | -              | 17,5           | 257                 | 284,5 | 311,1          | 423                | 3              | 3               | 1 830               | 2 800                 | 290                | 2 400             | 900               |
| -              | -              | 17,5           | 257                 | 284,5 | 311,1          | 423                | 3              | 3               | 1 830               | 2 800                 | 290                | 2 400             | 900               |
| -              | -              | -              | 260                 | 303   | 335            | 480                | 4              | 4               | 1 730               | 2 280                 | 221                | 2 200             | 1 000             |
| 22             | 35,5           | -              | 260                 | 303   | 335            | 480                | 4              | 4               | 1 730               | 2 280                 | 221                | 2 200             | 1 000             |
| -              | -              | -              | 260                 | 300,5 | 332,7          | 480                | 4              | 4               | 2 600               | 3 750                 | 375                | 2 000             | 750               |
| 22             | 44,5           | -              | 260                 | 300,5 | 332,7          | 480                | 4              | 4               | 2 600               | 3 750                 | 375                | 2 000             | 750               |
| -              | -              | 22,5           | 260                 | 300,5 | 332,7          | 480                | 4              | 4               | 2 600               | 3 750                 | 375                | 2 000             | 750               |
| -              | -              | -              | 270                 | 327   | 368            | 550                | 5              | 5               | 2 240               | 2 900                 | 275                | 1 900             | 850               |
| 28             | 49             | -              | 270                 | 327   | 368            | 550                | 5              | 5               | 2 240               | 2 900                 | 275                | 1 900             | 850               |
| -              | -              | -              | 269                 | 272   | 284            | 311                | 2              | 1               | 380                 | 690                   | 72                 | 3 200             | 1 400             |
| -              | -              | 6              | 269                 | 272   | 284            | 311                | 2              | 1               | 380                 | 690                   | 72                 | 3 200             | 1 400             |

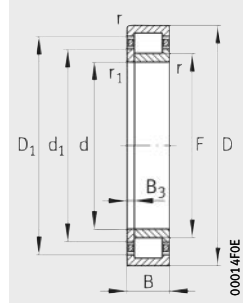


# Cylindrical roller bearings with cage

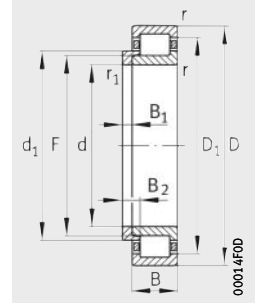
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing



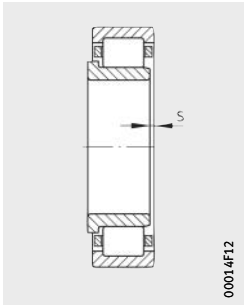
Design 1  
NJ and HJ  
Locating bearing

Dimension table (continued) · Dimensions in mm

| Designation    |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |     |     |     |                |                 |     |                |                |
|----------------|-------------------|-------------|----------------|--------------------------|------------|-----|-----|-----|----------------|-----------------|-----|----------------|----------------|
| Bearing        | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D   | B   | r   | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |
|                |                   |             |                |                          |            |     |     |     |                |                 |     |                |                |
|                |                   |             |                |                          |            |     |     |     |                |                 |     |                |                |
| NJ1952-M1      | –                 | 1           | 14,2           | –                        | 260        | 360 | 46  | 2,1 | 1,5            | 5,3             | 286 | 324,4          | –              |
| NJ1952-M1      | HJ1952            | 1           | 14,2           | 1,9                      | 260        | 360 | 46  | 2,1 | 1,5            | –               | 286 | 324,4          | –              |
| NJ1952-M1A     | –                 | 1           | 14,2           | –                        | 260        | 360 | 46  | 2,1 | 1,5            | 5,3             | 286 | 324,4          | –              |
| NJ1952-M1A     | HJ1952            | 1           | 14,2           | 1,9                      | 260        | 360 | 46  | 2,1 | 1,5            | –               | 286 | 324,4          | –              |
| NJ1952-MPA     | –                 | 1           | 14,5           | –                        | 260        | 360 | 46  | 2,1 | 1,5            | 5,3             | 286 | 324,4          | 294            |
| NJ1952-MPA     | HJ1952            | 1           | 14,5           | 1,9                      | 260        | 360 | 46  | 2,1 | 1,5            | –               | 286 | 324,4          | 294            |
| NJ1052-M1      | –                 | 1           | 30,4           | –                        | 260        | 400 | 65  | 4   | 4              | 7,2             | 296 | 351,3          | 309,1          |
| NJ1052-M1      | HJ1052            | 1           | 30,4           | 3,36                     | 260        | 400 | 65  | 4   | 4              | –               | 296 | 351,3          | 309,1          |
| NJ1052-M1A     | –                 | 1           | 30,4           | –                        | 260        | 400 | 65  | 4   | 4              | 7,2             | 296 | 351,3          | 309,1          |
| NJ1052-M1A     | HJ1052            | 1           | 30,4           | 3,36                     | 260        | 400 | 65  | 4   | 4              | –               | 296 | 351,3          | 309,1          |
| NJ1052-MP1A    | –                 | 1           | 29             | –                        | 260        | 400 | 65  | 4   | 4              | 7,2             | 296 | 351,3          | 309,1          |
| NJ1052-MP1A    | HJ1052            | 1           | 29             | 3,36                     | 260        | 400 | 65  | 4   | 4              | –               | 296 | 351,3          | 309,1          |
| NUP1052-M1     | –                 | 1           | 31,2           | –                        | 260        | 400 | 65  | 4   | 4              | –               | 296 | 351,3          | 309,1          |
| NUP1052-M1A    | –                 | 1           | 31,5           | –                        | 260        | 400 | 65  | 4   | 4              | –               | 296 | 351,3          | 309,1          |
| NUP2052-E-M1   | –                 | 1           | 40,5           | –                        | 260        | 400 | 82  | 4   | 4              | –               | 294 | 356,3          | 308            |
| NUP2052-E-M1A  | –                 | 1           | 40,5           | –                        | 260        | 400 | 82  | 4   | 4              | –               | 294 | 356,3          | 308            |
| NJ252-E-M1     | –                 | 1           | 69,4           | –                        | 260        | 480 | 80  | 5   | 5              | 6,2             | 317 | 410,8          | 336,9          |
| NJ252-E-M1     | HJ252-E           | 1           | 69,4           | 5,92                     | 260        | 480 | 80  | 5   | 5              | –               | 317 | 410,8          | 336,9          |
| NJ252-E-M1A    | –                 | 1           | 69,4           | –                        | 260        | 480 | 80  | 5   | 5              | 6,2             | 317 | 410,8          | 336,9          |
| NJ252-E-M1A    | HJ252-E           | 1           | 69,4           | 5,92                     | 260        | 480 | 80  | 5   | 5              | –               | 317 | 410,8          | 336,9          |
| NJ2252-E-M1    | –                 | 1           | 110            | –                        | 260        | 480 | 130 | 5   | 5              | 10,5            | 313 | 413,6          | 335,6          |
| NJ2252-E-M1    | HJ2252-E          | 1           | 110            | 6,44                     | 260        | 480 | 130 | 5   | 5              | –               | 313 | 413,6          | 335,6          |
| NJ2252-E-M1A   | –                 | 1           | 110            | –                        | 260        | 480 | 130 | 5   | 5              | 10,5            | 313 | 413,6          | 335,6          |
| NJ2252-E-M1A   | HJ2252-E          | 1           | 110            | 6,44                     | 260        | 480 | 130 | 5   | 5              | –               | 313 | 413,6          | 335,6          |
| NUP2252-E-M1   | –                 | 1           | 112            | –                        | 260        | 480 | 130 | 5   | 5              | –               | 313 | 413,6          | 335,6          |
| NUP2252-E-M1A  | –                 | 1           | 112            | –                        | 260        | 480 | 130 | 5   | 5              | –               | 313 | 413,6          | 335,6          |
| NJ352-E-M1     | –                 | 1           | 122            | –                        | 260        | 540 | 102 | 6   | 6              | 10              | 337 | 454,6          | 362,9          |
| NJ2352-EX-M1   | –                 | 1           | 192            | –                        | 260        | 540 | 165 | 6   | 6              | 13,7            | 324 | 458,4          | 353,5          |
| NJ2352-EX-M1   | HJ2352-EX         | 1           | 192            | 11                       | 260        | 540 | 165 | 6   | 6              | –               | 324 | 458,4          | 353,5          |
| NJ2352-EX-M1A  | –                 | 1           | 192            | –                        | 260        | 540 | 165 | 6   | 6              | 13,7            | 324 | 458,4          | 353,5          |
| NJ2352-EX-M1A  | HJ2352-EX         | 1           | 192            | 11                       | 260        | 540 | 165 | 6   | 6              | –               | 324 | 458,4          | 353,5          |
| NJ2352-EX-MPA  | –                 | 1           | 194            | –                        | 260        | 540 | 165 | 6   | 6              | 13,7            | 324 | 458,4          | 353,5          |
| NJ2352-EX-MPA  | HJ2352-EX         | 1           | 194            | 11                       | 260        | 540 | 165 | 6   | 6              | –               | 324 | 458,4          | 353,5          |
| NUP2352-EX-M1  | –                 | 1           | 206            | –                        | 260        | 540 | 165 | 6   | 6              | –               | 324 | 458,4          | 353,5          |
| NUP2352-EX-M1A | –                 | 1           | 206            | –                        | 260        | 540 | 165 | 6   | 6              | –               | 324 | 458,4          | 353,5          |

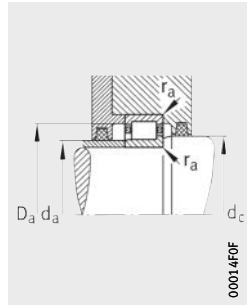
<sup>1)</sup> Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.





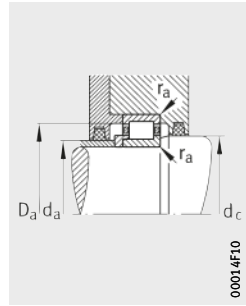
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2) Axial displacement "s" for NJ



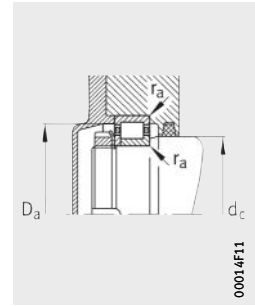
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Mounting dimensions for NJ



00014F10

Mounting dimensions for NJ and HJ



00014F11

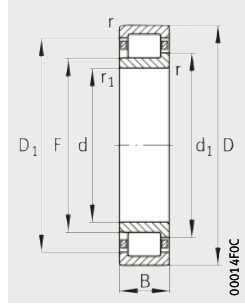
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |       |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed | Reference speed |
|----------------|----------------|----------------|---------------------|-------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|----------------|-----------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |       | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub> | n <sub>B</sub>  |
|                |                |                | min. <sup>1)</sup>  | max.  | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    |                    |                |                 |
| -              | -              | -              | 268                 | 283   | 299            | 349                | 2              | 2               | 425                 | 735                   | 56                 | 3 000          | -               |
| 14             | 25             | -              | 268                 | 283   | 299            | 349                | 2              | 2               | 425                 | 735                   | 56                 | 3 000          | -               |
| -              | -              | -              | 268                 | 283   | 299            | 349                | 2              | 2               | 425                 | 735                   | 56                 | 3 000          | -               |
| 14             | 25             | -              | 268                 | 283   | 299            | 349                | 2              | 2               | 425                 | 735                   | 56                 | 3 000          | -               |
| -              | -              | -              | 268                 | 283   | 299            | 349                | 2              | 2               | 425                 | 735                   | 73                 | 3 000          | -               |
| 14             | 25             | -              | 268                 | 283   | 299            | 349                | 2              | 2               | 425                 | 735                   | 73                 | 3 000          | -               |
| -              | -              | -              | 275                 | 292   | 312            | 385                | 3              | 3               | 655                 | 1020                  | 105                | 2 800          | 1 700           |
| 16             | 31,5           | -              | 275                 | 292   | 312            | 385                | 3              | 3               | 655                 | 1020                  | 105                | 2 800          | 1 700           |
| -              | -              | -              | 275                 | 292   | 312            | 385                | 3              | 3               | 655                 | 1020                  | 105                | 2 800          | 1 700           |
| 16             | 31,5           | -              | 275                 | 292   | 312            | 385                | 3              | 3               | 655                 | 1020                  | 105                | 2 800          | 1 700           |
| -              | -              | -              | 275                 | 292   | 312            | 385                | 3              | 3               | 655                 | 1020                  | 105                | 2 800          | 1 700           |
| 16             | 31,5           | -              | 275                 | 292   | 312            | 385                | 3              | 3               | 655                 | 1020                  | 105                | 2 800          | 1 700           |
| -              | -              | 15,5           | 275                 | 292   | 312            | 385                | 3              | 3               | 655                 | 1020                  | 104                | 2 800          | 1 700           |
| -              | -              | 15,5           | 275                 | 292   | 312            | 385                | 3              | 3               | 655                 | 1020                  | 104                | 2 800          | 1 700           |
| -              | -              | 10             | 275                 | 291   | 314            | 385                | 3              | 3               | 1 200               | 2 080                 | 216                | 2 600          | 1 200           |
| -              | -              | 10             | 275                 | 291   | 314            | 385                | 3              | 3               | 1 200               | 2 080                 | 216                | 2 600          | 1 200           |
| -              | -              | -              | 280                 | 314   | 341            | 460                | 4              | 4               | 1 340               | 1 900                 | 191                | 2 400          | 1 110           |
| 18             | 30             | -              | 280                 | 314   | 341            | 460                | 4              | 4               | 1 340               | 1 900                 | 191                | 2 400          | 1 110           |
| -              | -              | -              | 280                 | 314   | 341            | 460                | 4              | 4               | 1 340               | 1 900                 | 191                | 2 400          | 1 110           |
| 18             | 30             | -              | 280                 | 314   | 341            | 460                | 4              | 4               | 1 340               | 1 900                 | 191                | 2 400          | 1 110           |
| -              | -              | -              | 280                 | 310   | 339            | 460                | 4              | 4               | 2 160               | 3 350                 | 340                | 2 200          | 780             |
| 18             | 35,5           | -              | 280                 | 310   | 339            | 460                | 4              | 4               | 2 160               | 3 350                 | 340                | 2 200          | 780             |
| -              | -              | -              | 280                 | 310   | 339            | 460                | 4              | 4               | 2 160               | 3 350                 | 340                | 2 200          | 780             |
| 18             | 35,5           | -              | 280                 | 310   | 339            | 460                | 4              | 4               | 2 160               | 3 350                 | 340                | 2 200          | 780             |
| -              | -              | 17,5           | 280                 | 310   | 339            | 460                | 4              | 4               | 2 160               | 3 350                 | 340                | 2 200          | 800             |
| -              | -              | 17,5           | 280                 | 310   | 339            | 460                | 4              | 4               | 2 160               | 3 350                 | 340                | 2 200          | 800             |
| -              | -              | -              | 286                 | 334,3 | 366,2          | 514                | 5              | 5               | 1 900               | 2 600                 | 249                | 2 000          | 900             |
| -              | -              | -              | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| 24             | 46,5           | -              | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| -              | -              | -              | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| 24             | 46,5           | -              | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| -              | -              | -              | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| 24             | 46,5           | -              | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| -              | -              | -              | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| 24             | 46,5           | -              | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| -              | -              | 22,5           | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |
| -              | -              | 22,5           | 286                 | 321,3 | 356,8          | 514                | 5              | 5               | 3 100               | 4 500                 | 435                | 1 800          | 670             |

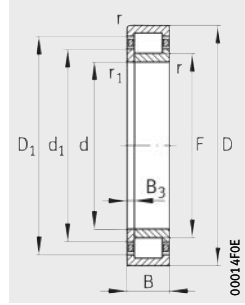


# Cylindrical roller bearings with cage

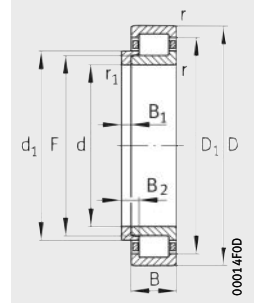
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

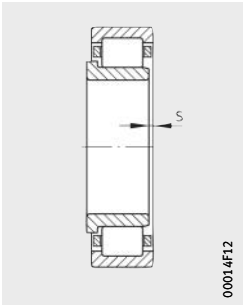


Design 1  
NJ and HJ  
Locating bearing

**Dimension table (continued)** · Dimensions in mm

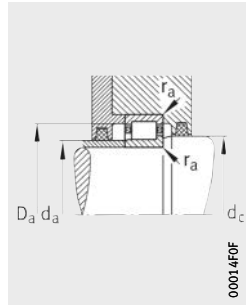
| Designation   |                   | De-<br>sign | Mass<br>m       |                           | Dimensions |     |     |     |                |                 |     |                |                |
|---------------|-------------------|-------------|-----------------|---------------------------|------------|-----|-----|-----|----------------|-----------------|-----|----------------|----------------|
| Bearing       | L-section<br>ring |             | Bearing<br>≈ kg | L-section<br>ring<br>≈ kg | d          | D   | B   | r   | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |
|               |                   |             |                 |                           |            |     |     |     |                |                 |     |                |                |
|               |                   |             |                 |                           |            |     |     |     |                |                 |     |                |                |
| NJ1856-M1     | –                 | 1           | 7,26            | –                         | 280        | 350 | 33  | 2   | 1,1            | 4               | 299 | 327,1          | 304,8          |
| NJ1856-M1     | HJ1856            | 1           | 7,26            | 1,04                      | 280        | 350 | 33  | 2   | 1,1            | –               | 299 | 327,1          | 304,8          |
| NJ2856-M1     | –                 | 1           | 9,22            | –                         | 280        | 350 | 42  | 2   | 2              | 5,3             | 299 | 327,1          | 304,8          |
| NUP2856-M1    | –                 | 1           | 9,43            | –                         | 280        | 350 | 42  | 2   | 2              | –               | 299 | 327,1          | 304,8          |
| NJ1956-M1     | –                 | 1           | 15,3            | –                         | 280        | 380 | 46  | 2,1 | 1,5            | 5,2             | 306 | 345,4          | 314            |
| NJ1956-M1     | HJ1956            | 1           | 15,3            | 2,16                      | 280        | 380 | 46  | 2,1 | 1,5            | –               | 306 | 345,4          | 314            |
| NJ1956-M1A    | –                 | 1           | 15,3            | –                         | 280        | 380 | 46  | 2,1 | 1,5            | 5,2             | 306 | 345,4          | 314            |
| NJ1956-M1A    | HJ1956            | 1           | 15,3            | 2,16                      | 280        | 380 | 46  | 2,1 | 1,5            | –               | 306 | 345,4          | 314            |
| NJ2956-M1     | –                 | 1           | 20,5            | –                         | 280        | 380 | 60  | 2,1 | 1,5            | 6,9             | 306 | 346            | 314            |
| NJ1056-M1     | –                 | 1           | 32,2            | –                         | 280        | 420 | 65  | 4   | 4              | 7,2             | 316 | 371,3          | 329,1          |
| NJ1056-M1     | HJ1056            | 1           | 32,2            | 3,59                      | 280        | 420 | 65  | 4   | 4              | –               | 316 | 371,3          | 329,1          |
| NJ1056-M1A    | –                 | 1           | 32,2            | –                         | 280        | 420 | 65  | 4   | 4              | 7,2             | 316 | 371,3          | 329,1          |
| NJ1056-M1A    | HJ1056            | 1           | 32,2            | 3,59                      | 280        | 420 | 65  | 4   | 4              | –               | 316 | 371,3          | 329,1          |
| NJ1056-MP1A   | –                 | 1           | 31,7            | –                         | 280        | 420 | 65  | 4   | 4              | 7,2             | 316 | 371,3          | 329,1          |
| NJ1056-MP1A   | HJ1056            | 1           | 32,2            | 3,59                      | 280        | 420 | 65  | 4   | 4              | –               | 316 | 371,3          | 329,1          |
| NUP2056-E-M1  | –                 | 1           | 42,9            | –                         | 280        | 420 | 82  | 4   | 4              | –               | 314 | 376,3          | 328            |
| NUP2056-E-M1A | –                 | 1           | 42,9            | –                         | 280        | 420 | 82  | 4   | 4              | –               | 314 | 376,3          | 328            |
| NJ256-E-M1    | –                 | 1           | 73,2            | –                         | 280        | 500 | 80  | 5   | 5              | 6,3             | 337 | 430,8          | 358,2          |
| NJ256-E-M1    | HJ256-E           | 1           | 73,2            | 6,51                      | 280        | 500 | 80  | 5   | 5              | –               | 337 | 430,8          | 358,2          |
| NJ256-E-M1A   | –                 | 1           | 73,2            | –                         | 280        | 500 | 80  | 5   | 5              | 6,3             | 337 | 430,8          | 358,2          |
| NJ256-E-M1A   | HJ256-E           | 1           | 73,2            | 6,51                      | 280        | 500 | 80  | 5   | 5              | –               | 337 | 430,8          | 358,2          |
| NUP256-E-M1   | –                 | 1           | 74,3            | –                         | 280        | 500 | 80  | 5   | 5              | –               | 337 | 430,8          | 358,2          |
| NUP256-E-M1A  | –                 | 1           | 74,3            | –                         | 280        | 500 | 80  | 5   | 5              | –               | 337 | 430,8          | 358,2          |
| NJ2256-E-M1   | –                 | 1           | 116             | –                         | 280        | 500 | 130 | 5   | 5              | 10,5            | 333 | 436            | 355,6          |
| NJ2256-E-M1   | HJ2256-E          | 1           | 116             | 6,85                      | 280        | 500 | 130 | 5   | 5              | –               | 333 | 436            | 355,6          |
| NJ2256-E-M1A  | –                 | 1           | 116             | –                         | 280        | 500 | 130 | 5   | 5              | 10,5            | 333 | 436            | 355,6          |
| NJ2256-E-M1A  | HJ2256-E          | 1           | 116             | 6,85                      | 280        | 500 | 130 | 5   | 5              | –               | 333 | 436            | 355,6          |
| NUP2256-E-M1  | –                 | 1           | 117             | –                         | 280        | 500 | 130 | 5   | 5              | –               | 333 | 436            | 355,6          |
| NUP2256-E-M1A | –                 | 1           | 117             | –                         | 280        | 500 | 130 | 5   | 5              | –               | 333 | 436            | 355,6          |
| NJ356-E-M1    | –                 | 1           | 149             | –                         | 280        | 580 | 108 | 6   | 6              | 8,7             | 362 | 488            | 389,8          |
| NJ356-E-M1    | HJ356-E           | 1           | 149             | 13,7                      | 280        | 580 | 108 | 6   | 6              | –               | 362 | 488            | 389,8          |
| NJ2356-EX-M1  | –                 | 1           | 237             | –                         | 280        | 580 | 175 | 6   | 6              | 13              | 351 | 493,8          | 382,3          |
| NJ2356-EX-M1  | HJ2356-EX         | 1           | 237             | 13,8                      | 280        | 580 | 175 | 6   | 6              | –               | 351 | 493,8          | 382,3          |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



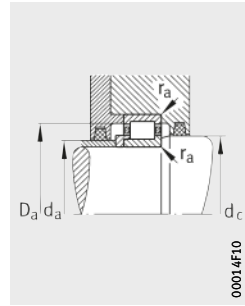
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2) Axial displacement "s" for NJ



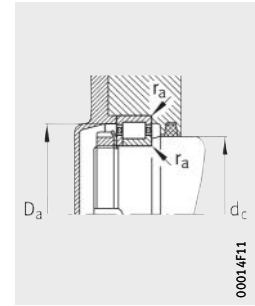
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Mounting dimensions for NJ



00014F10

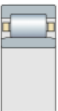
Mounting dimensions for NJ and HJ



00014F11

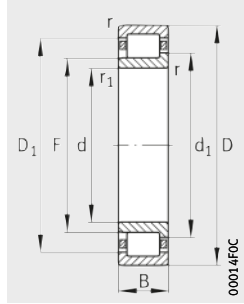
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load    | Limiting speed                      | Reference speed                     |
|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|-----------------------|-------------------------------------|-------------------------------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub><br>kN | n <sub>G</sub><br>min <sup>-1</sup> | n <sub>B</sub><br>min <sup>-1</sup> |
|                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    |                       |                                     |                                     |
| -              | -              | -              | 289                 | 296  | 308            | 341                | 2              | 1               | 255                 | 500                   | 48,5                  | 3 200                               | -                                   |
| 10             | 18             | -              | 289                 | 296  | 308            | 341                | 2              | 1               | 255                 | 500                   | 48,5                  | 3 200                               | -                                   |
| -              | -              | -              | 289                 | 296  | 308            | 341                | 2              | 1               | 345                 | 735                   | 74                    | 3 000                               | 1 400                               |
| -              | -              | 9              | 289                 | 296  | 308            | 341                | 2              | 1               | 345                 | 735                   | 75                    | 3 000                               | 1 400                               |
| -              | -              | -              | 288                 | 303  | 319            | 369                | 2              | 1,5             | 440                 | 800                   | 78                    | 2 800                               | -                                   |
| 15             | 26             | -              | 288                 | 303  | 319            | 369                | 2              | 1,5             | 440                 | 800                   | 78                    | 2 800                               | -                                   |
| -              | -              | -              | 288                 | 303  | 319            | 369                | 2              | 1,5             | 440                 | 800                   | 78                    | 2 800                               | -                                   |
| 15             | 26             | -              | 288                 | 303  | 319            | 369                | 2              | 1,5             | 440                 | 800                   | 78                    | 2 800                               | -                                   |
| -              | -              | -              | 288                 | 303  | 319            | 370                | 2              | 1,5             | 620                 | 1 220                 | 126                   | 2 800                               | 1 300                               |
| -              | -              | -              | 295                 | 312  | 333            | 405                | 3              | 3               | 680                 | 1 100                 | 112                   | 2 800                               | 1 500                               |
| 16             | 31,5           | -              | 295                 | 312  | 333            | 405                | 3              | 3               | 680                 | 1 100                 | 112                   | 2 800                               | 1 500                               |
| -              | -              | -              | 295                 | 312  | 333            | 405                | 3              | 3               | 680                 | 1 100                 | 112                   | 2 800                               | 1 500                               |
| 16             | 31,5           | -              | 295                 | 312  | 333            | 405                | 3              | 3               | 680                 | 1 100                 | 112                   | 2 800                               | 1 500                               |
| -              | -              | -              | 295                 | 312  | 333            | 405                | 3              | 3               | 695                 | 1 140                 | 116                   | 2 800                               | 1 500                               |
| 16             | 31,5           | -              | 295                 | 312  | 333            | 405                | 3              | 3               | 680                 | 1 100                 | 112                   | 2 800                               | 1 500                               |
| -              | -              | 10             | 295                 | 311  | 334            | 405                | 3              | 3               | 1 220               | 2 160                 | 223                   | 2 600                               | 1 100                               |
| -              | -              | 10             | 295                 | 311  | 334            | 405                | 3              | 3               | 1 220               | 2 160                 | 223                   | 2 600                               | 1 100                               |
| -              | -              | -              | 300                 | 334  | 362            | 480                | 4              | 4               | 1 400               | 2 000                 | 201                   | 2 200                               | 1 020                               |
| 18             | 30             | -              | 300                 | 334  | 362            | 480                | 4              | 4               | 1 400               | 2 000                 | 201                   | 2 200                               | 1 020                               |
| -              | -              | -              | 300                 | 334  | 362            | 480                | 4              | 4               | 1 400               | 2 000                 | 201                   | 2 200                               | 1 020                               |
| 18             | 30             | -              | 300                 | 334  | 362            | 480                | 4              | 4               | 1 400               | 2 000                 | 201                   | 2 200                               | 1 020                               |
| -              | -              | 12             | 300                 | 334  | 362            | 480                | 4              | 4               | 1 400               | 2 000                 | 200                   | 2 200                               | 1 000                               |
| -              | -              | 12             | 300                 | 334  | 362            | 480                | 4              | 4               | 1 400               | 2 000                 | 200                   | 2 200                               | 1 000                               |
| -              | -              | -              | 300                 | 330  | 359            | 480                | 4              | 4               | 2 280               | 3 600                 | 360                   | 2 000                               | 720                                 |
| 18             | 35,5           | -              | 300                 | 330  | 359            | 480                | 4              | 4               | 2 280               | 3 600                 | 360                   | 2 000                               | 720                                 |
| -              | -              | -              | 300                 | 330  | 359            | 480                | 4              | 4               | 2 280               | 3 600                 | 360                   | 2 000                               | 720                                 |
| 18             | 35,5           | -              | 300                 | 330  | 359            | 480                | 4              | 4               | 2 280               | 3 600                 | 360                   | 2 000                               | 720                                 |
| -              | -              | 17,5           | 300                 | 330  | 359            | 480                | 4              | 4               | 2 280               | 3 600                 | 360                   | 2 000                               | 700                                 |
| -              | -              | 17,5           | 300                 | 330  | 359            | 480                | 4              | 4               | 2 280               | 3 600                 | 360                   | 2 000                               | 700                                 |
| -              | -              | -              | 306                 | 359  | 393,4          | 554                | 5              | 5               | 2 160               | 3 050                 | 285                   | 1 900                               | 790                                 |
| 26             | 42,5           | -              | 306                 | 359  | 393,4          | 554                | 5              | 5               | 2 160               | 3 050                 | 285                   | 1 900                               | 790                                 |
| -              | -              | -              | 306                 | 348  | 385,9          | 554                | 5              | 5               | 3 550               | 5 200                 | 495                   | 1 600                               | 600                                 |
| 26             | 48,5           | -              | 306                 | 348  | 385,9          | 554                | 5              | 5               | 3 550               | 5 200                 | 495                   | 1 600                               | 600                                 |

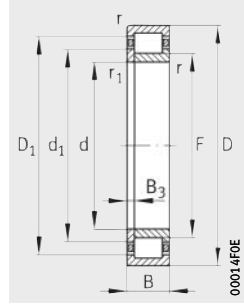


# Cylindrical roller bearings with cage

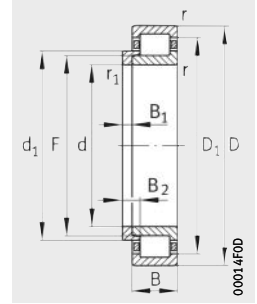
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

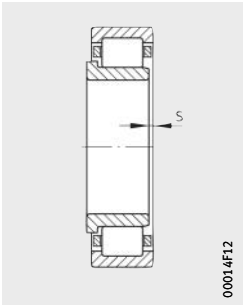


Design 1  
NJ and HJ  
Locating bearing

**Dimension table (continued)** · Dimensions in mm

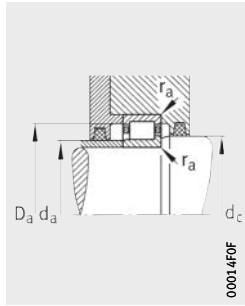
| Designation   |                   | De-<br>sign | Mass<br>m       |                           | Dimensions |     |      |      |                |                 |     |                |                |
|---------------|-------------------|-------------|-----------------|---------------------------|------------|-----|------|------|----------------|-----------------|-----|----------------|----------------|
| Bearing       | L-section<br>ring |             | Bearing<br>≈ kg | L-section<br>ring<br>≈ kg | d          | D   | B    | r    | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> | d <sub>1</sub> |
|               |                   |             |                 |                           |            |     | min. | min. |                |                 | ≈   | ≈              |                |
| NJ1860-M1     | –                 | 1           | 10,2            | –                         | 300        | 380 | 38   | 2,1  | 1,5            | 4,3             | 322 | 355,2          | 328,7          |
| NJ1860-M1     | HJ1860            | 1           | 10,2            | 1,54                      | 300        | 380 | 38   | 2,1  | 1,5            | –               | 322 | 355,2          | 328,7          |
| NJ1860-MPA    | –                 | 1           | 10              | –                         | 300        | 380 | 38   | 2,1  | 1,5            | 4,3             | 322 | 355,2          | 328,7          |
| NJ1860-MPA    | HJ1860            | 1           | 10              | 1,54                      | 300        | 380 | 38   | 2,1  | 1,5            | –               | 322 | 355,2          | 328,7          |
| NJ2860-M1     | –                 | 1           | 13,1            | –                         | 300        | 380 | 48   | 2,1  | 1,5            | 5,3             | 322 | 355,2          | 328,7          |
| NUP2860-M1    | –                 | 1           | 13,4            | –                         | 300        | 380 | 48   | 2,1  | 1,5            | –               | 322 | 355,2          | 328,7          |
| NJ1960-M1     | –                 | 1           | 24,2            | –                         | 300        | 420 | 56   | 3    | 3              | 6,5             | 330 | 378            | 340            |
| NJ1960-M1     | HJ1960            | 1           | 24,2            | 3,29                      | 300        | 420 | 56   | 3    | 3              | –               | 330 | 378            | 340            |
| NJ1960-M1A    | –                 | 1           | 24,2            | –                         | 300        | 420 | 56   | 3    | 3              | 6,5             | 330 | 378            | 340            |
| NJ1960-M1A    | HJ1960            | 1           | 24,2            | 3,29                      | 300        | 420 | 56   | 3    | 3              | –               | 330 | 378            | 340            |
| NJ1060-M1     | –                 | 1           | 45,7            | –                         | 300        | 460 | 74   | 4    | 4              | 11,9            | 340 | 405,2          | 355,7          |
| NJ1060-M1     | HJ1060            | 1           | 45,7            | 5,17                      | 300        | 460 | 74   | 4    | 4              | –               | 340 | 405,2          | 355,7          |
| NJ1060-M1A    | –                 | 1           | 45,7            | –                         | 300        | 460 | 74   | 4    | 4              | 11,9            | 340 | 405,2          | 355,7          |
| NJ1060-M1A    | HJ1060            | 1           | 45,7            | 5,17                      | 300        | 460 | 74   | 4    | 4              | –               | 340 | 405,2          | 355,7          |
| NJ1060-MP1A   | –                 | 1           | 44,6            | –                         | 300        | 460 | 74   | 4    | 4              | 11,9            | 340 | 405,2          | 355,7          |
| NJ1060-MP1A   | HJ1060            | 1           | 44,6            | 5,17                      | 300        | 460 | 74   | 4    | 4              | –               | 340 | 405,2          | 355,7          |
| NUP2060-E-M1  | –                 | 1           | 61,5            | –                         | 300        | 460 | 95   | 4    | 4              | –               | 341 | 409,9          | 356,3          |
| NUP2060-E-M1A | –                 | 1           | 61,5            | –                         | 300        | 460 | 95   | 4    | 4              | –               | 341 | 409,9          | 356,3          |
| NJ260-E-M1    | –                 | 1           | 91,6            | –                         | 300        | 540 | 85   | 5    | 5              | 6,9             | 364 | 464,6          | 385,6          |
| NJ260-E-M1    | HJ260-E           | 1           | 91,6            | 8,31                      | 300        | 540 | 85   | 5    | 5              | –               | 364 | 464,6          | 385,6          |
| NJ260-E-M1A   | –                 | 1           | 91,6            | –                         | 300        | 540 | 85   | 5    | 5              | 6,9             | 364 | 464,6          | 385,6          |
| NJ260-E-M1A   | HJ260-E           | 1           | 91,6            | 8,31                      | 300        | 540 | 85   | 5    | 5              | –               | 364 | 464,6          | 385,6          |
| NUP260-E-M1   | –                 | 1           | 92,8            | –                         | 300        | 540 | 85   | 5    | 5              | –               | 364 | 464,6          | 385,6          |
| NUP260-E-M1A  | –                 | 1           | 92,8            | –                         | 300        | 540 | 85   | 5    | 5              | –               | 364 | 464,6          | 385,6          |
| NJ2260-EX-M1  | –                 | 1           | 146             | –                         | 300        | 540 | 140  | 5    | 5              | 12,2            | 355 | 472,6          | 380,9          |
| NJ2260-EX-M1  | HJ2260-E          | 1           | 146             | 9,8                       | 300        | 540 | 140  | 5    | 5              | –               | 355 | 472,6          | 380,9          |
| NUP2260-EX-M1 | –                 | 1           | 148             | –                         | 300        | 540 | 140  | 5    | 5              | –               | 355 | 472,6          | 380,9          |
| NJ1864-M1     | –                 | 1           | 11              | –                         | 320        | 400 | 38   | 2,1  | 1,5            | 4,3             | 341 | 373,8          | 347,7          |
| NJ1864-M1     | HJ1864            | 1           | 11              | 1,59                      | 320        | 400 | 38   | 2,1  | 1,5            | –               | 341 | 373,8          | 347,7          |
| NJ1864-MP1A   | –                 | 1           | 10,8            | –                         | 320        | 400 | 38   | 2,1  | 1,5            | 4,3             | 341 | 373,8          | 347,7          |
| NJ1864-MP1A   | HJ1864            | 1           | 10,8            | 1,59                      | 320        | 400 | 38   | 2,1  | 1,5            | –               | 341 | 373,8          | 347,7          |
| NUP1864-M1    | –                 | 1           | 11,3            | –                         | 320        | 400 | 38   | 2,1  | 1,5            | –               | 341 | 373,8          | 347,7          |
| NJ2864-M1     | –                 | 1           | 14,3            | –                         | 320        | 400 | 48   | 2,1  | 1,5            | 5,3             | 341 | 373,8          | 347,7          |
| NUP2864-M1    | –                 | 1           | 14,6            | –                         | 320        | 400 | 48   | 2,1  | 1,5            | –               | 341 | 373,8          | 347,7          |
| NJ1964-M1     | –                 | 1           | 25,6            | –                         | 320        | 440 | 56   | 3    | 3              | 6,2             | 350 | 398            | 360            |

<sup>1)</sup> Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



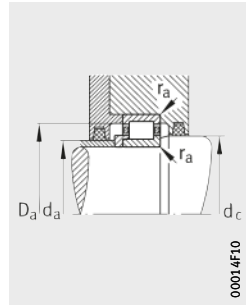
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2) Axial displacement "s" for NJ



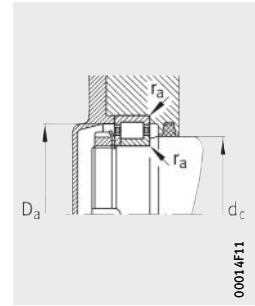
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Mounting dimensions for NJ



00014F10

Mounting dimensions for NJ and HJ



00014F11

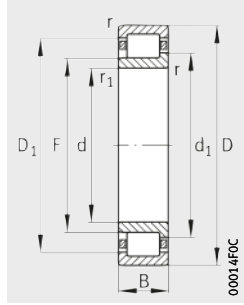
Mounting dimensions for NUP

|       |       |       | Mounting dimensions |      |       |                    |       |          | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|-------|-------|-------|---------------------|------|-------|--------------------|-------|----------|---------------------|-------------------------|--------------------------------------|--|---|
| $B_1$ | $B_2$ | $B_3$ | $d_a$               |      | $d_c$ | $D_a$              | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
|       |       |       | min. <sup>1)</sup>  | max. | min.  | max. <sup>1)</sup> | max.  | max.     |                     |                         |                                      |  |   |
| -     | -     | -     | 310                 | 319  | 332   | 370                | 2     | 1,5      | 335                 | 640                     | 62                                   | 2 800  | -   |
| 12    | 21    | -     | 310                 | 319  | 332   | 370                | 2     | 1,5      | 335                 | 640                     | 62                                   | 2 800  | -   |
| -     | -     | -     | 310                 | 319  | 332   | 370                | 2     | 1,5      | 335                 | 640                     | 62                                   | 2 800  | -   |
| 12    | 21    | -     | 310                 | 319  | 332   | 370                | 2     | 1,5      | 335                 | 640                     | 62                                   | 2 800  | -   |
| -     | -     | -     | 310                 | 319  | 332   | 370                | 2     | 1,5      | 475                 | 1 000                   | 101                                  | 2 800  | 1 200   |
| -     | -     | 9     | 310                 | 319  | 332   | 370                | 2     | 1,5      | 475                 | 1 000                   | 101                                  | 2 800  | 1 200   |
| -     | -     | -     | 312                 | 327  | 345   | 408                | 2,5   | 2,5      | 600                 | 1 020                   | 99                                   | 2 800  | -   |
| 18    | 31    | -     | 312                 | 327  | 345   | 408                | 2,5   | 2,5      | 600                 | 1 020                   | 99                                   | 2 800  | -   |
| -     | -     | -     | 312                 | 327  | 345   | 408                | 2,5   | 2,5      | 600                 | 1 020                   | 99                                   | 2 800  | -   |
| 18    | 31    | -     | 312                 | 327  | 345   | 408                | 2,5   | 2,5      | 600                 | 1 020                   | 99                                   | 2 800  | -   |
| -     | -     | -     | 315                 | 336  | 359   | 445                | 3     | 3        | 900                 | 1 430                   | 139                                  | 2 400  | 1 400   |
| 19    | 36    | -     | 315                 | 336  | 359   | 445                | 3     | 3        | 900                 | 1 430                   | 139                                  | 2 400  | 1 400   |
| -     | -     | -     | 315                 | 336  | 359   | 445                | 3     | 3        | 900                 | 1 430                   | 139                                  | 2 400  | 1 400   |
| -     | -     | -     | 315                 | 336  | 359   | 445                | 3     | 3        | 900                 | 1 430                   | 139                                  | 2 400  | 1 400   |
| 19    | 36    | -     | 315                 | 336  | 359   | 445                | 3     | 3        | 900                 | 1 430                   | 139                                  | 2 400  | 1 400   |
| -     | -     | -     | 315                 | 336  | 359   | 445                | 3     | 3        | 900                 | 1 430                   | 139                                  | 2 400  | 1 400   |
| 19    | 36    | -     | 315                 | 336  | 359   | 445                | 3     | 3        | 900                 | 1 430                   | 139                                  | 2 400  | 1 400   |
| -     | -     | 12,5  | 315                 | 338  | 363   | 445                | 3     | 3        | 1 500               | 2 700                   | 275                                  | 2 200  | 950   |
| -     | -     | 12,5  | 315                 | 338  | 363   | 445                | 3     | 3        | 1 500               | 2 700                   | 275                                  | 2 200  | 950   |
| -     | -     | -     | 320                 | 359  | 390   | 520                | 4     | 4        | 1 600               | 2 320                   | 225                                  | 2 000  | 920   |
| 20    | 32,5  | -     | 320                 | 359  | 390   | 520                | 4     | 4        | 1 600               | 2 320                   | 225                                  | 2 000  | 920   |
| -     | -     | -     | 320                 | 359  | 390   | 520                | 4     | 4        | 1 600               | 2 320                   | 225                                  | 2 000  | 920   |
| 20    | 32,5  | -     | 320                 | 359  | 390   | 520                | 4     | 4        | 1 600               | 2 320                   | 225                                  | 2 000  | 920   |
| -     | -     | 12,5  | 320                 | 359  | 390   | 520                | 4     | 4        | 1 600               | 2 320                   | 224                                  | 2 000  | 950   |
| -     | -     | 12,5  | 320                 | 359  | 390   | 520                | 4     | 4        | 1 600               | 2 320                   | 224                                  | 2 000  | 950   |
| -     | -     | -     | 320                 | 352  | 384,7 | 520                | 4     | 4        | 2 700               | 4 150                   | 395                                  | 1 900  | 630   |
| 20    | 40    | -     | 320                 | 352  | 384,7 | 520                | 4     | 4        | 2 700               | 4 150                   | 395                                  | 1 900  | 630   |
| -     | -     | 20    | 320                 | 352  | 384,7 | 520                | 4     | 4        | 2 700               | 4 150                   | 395                                  | 1 900  | 630   |
| -     | -     | -     | 330                 | 338  | 352   | 390                | 2     | 1,5      | 345                 | 695                     | 66                                   | 2 800  | -   |
| 12    | 21    | -     | 330                 | 338  | 352   | 390                | 2     | 1,5      | 345                 | 695                     | 66                                   | 2 800  | -   |
| -     | -     | -     | 330                 | 338  | 352   | 390                | 2     | 1,5      | 345                 | 695                     | 66                                   | 2 800  | -   |
| 12    | 21    | -     | 330                 | 338  | 352   | 390                | 2     | 1,5      | 345                 | 695                     | 66                                   | 2 800  | -   |
| -     | -     | 9     | 330                 | 338  | 352   | 390                | 2     | 1,5      | 345                 | 695                     | 66                                   | 2 800  | -   |
| -     | -     | -     | 330                 | 338  | 352   | 390                | 2     | 1,5      | 490                 | 1 080                   | 107                                  | 2 800  | 1 100   |
| -     | -     | 9     | 330                 | 338  | 352   | 390                | 2     | 1,5      | 490                 | 1 080                   | 107                                  | 2 800  | 1 100   |
| -     | -     | -     | 332                 | 346  | 365   | 428                | 2,5   | 2,5      | 620                 | 1 100                   | 104                                  | 2 600  | -   |

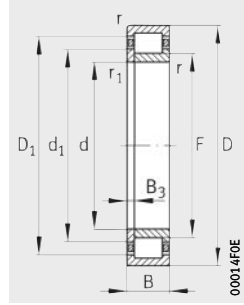


# Cylindrical roller bearings with cage

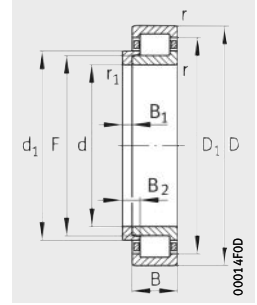
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

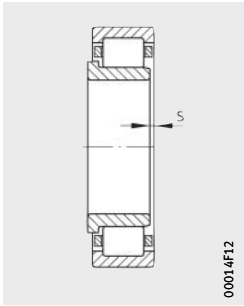


Design 1  
NJ and HJ  
Locating bearing

**Dimension table (continued)** · Dimensions in mm

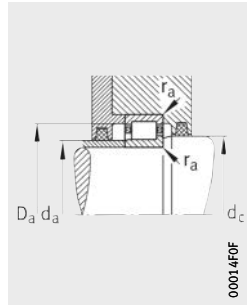
| Designation    |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |     |     |     |                |                 |       |                |                |
|----------------|-------------------|-------------|----------------|--------------------------|------------|-----|-----|-----|----------------|-----------------|-------|----------------|----------------|
| Bearing        | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D   | B   | r   | r <sub>1</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> | d <sub>1</sub> |
|                |                   |             |                |                          |            |     |     |     |                |                 |       |                |                |
| NJ1964-M1      | HJ1964            | 1           | 25,6           | 3,5                      | 320        | 440 | 56  | 3   | 3              | –               | 350   | 398            | 360            |
| NJ1964-M1A     | –                 | 1           | 25,6           | –                        | 320        | 440 | 56  | 3   | 3              | 6,2             | 350   | 398            | 360            |
| NJ1964-M1A     | HJ1964            | 1           | 25,6           | 3,5                      | 320        | 440 | 56  | 3   | 3              | –               | 350   | 398            | 360            |
| NJ1064-M1      | –                 | 1           | 48,1           | –                        | 320        | 480 | 74  | 4   | 4              | 8               | 360   | 425,1          | 375,4          |
| NJ1064-M1      | HJ1064            | 1           | 48,1           | 5,48                     | 320        | 480 | 74  | 4   | 4              | –               | 360   | 425,1          | 375,4          |
| NJ1064-M1A     | –                 | 1           | 48,1           | –                        | 320        | 480 | 74  | 4   | 4              | 8               | 360   | 425,1          | 375,4          |
| NJ1064-M1A     | HJ1064            | 1           | 48,1           | 5,48                     | 320        | 480 | 74  | 4   | 4              | –               | 360   | 425,1          | 375,4          |
| NJ1064-MP1A    | –                 | 1           | 47             | –                        | 320        | 480 | 74  | 4   | 4              | 8               | 360   | 425,1          | 375,4          |
| NJ1064-MP1A    | HJ1064            | 1           | 47             | 5,48                     | 320        | 480 | 74  | 4   | 4              | –               | 360   | 425,1          | 375,4          |
| NUP1064-M1     | –                 | 1           | 49,3           | –                        | 320        | 480 | 74  | 4   | 4              | –               | 360   | 425,1          | 375,4          |
| NJ264-EX-M1    | –                 | 1           | 115            | –                        | 320        | 580 | 92  | 5   | 5              | 7,5             | 392   | 499,4          | 415,8          |
| NJ264-EX-M1    | HJ264-E           | 1           | 115            | 10,1                     | 320        | 580 | 92  | 5   | 5              | –               | 392   | 499,4          | 415,8          |
| NJ264-EX-M1A   | –                 | 1           | 115            | –                        | 320        | 580 | 92  | 5   | 5              | 7,5             | 392   | 499,4          | 415,8          |
| NJ264-EX-M1A   | HJ264-E           | 1           | 115            | 10,1                     | 320        | 580 | 92  | 5   | 5              | –               | 392   | 499,4          | 415,8          |
| NUP264-EX-M1   | –                 | 1           | 117            | –                        | 320        | 580 | 92  | 5   | 5              | –               | 392   | 499,4          | 415,8          |
| NUP264-EX-M1A  | –                 | 1           | 117            | –                        | 320        | 580 | 92  | 5   | 5              | –               | 392   | 499,4          | 415,8          |
| NJ2264-EX-M1   | –                 | 1           | 183            | –                        | 320        | 580 | 150 | 5   | 5              | 11,9            | 380   | 506            | 407,8          |
| NJ2264-EX-M1   | HJ2264-EX         | 1           | 183            | 10,8                     | 320        | 580 | 150 | 5   | 5              | –               | 380   | 506            | 407,8          |
| NUP2264-EX-M1  | –                 | 1           | 237            | –                        | 320        | 580 | 150 | 5   | 5              | –               | 380   | 506            | 407,8          |
| NJ364-E-M1     | –                 | 1           | 216            | –                        | 320        | 670 | 112 | 7,5 | 7,5            | 8,9             | 420   | 554            | 450            |
| NJ1868-M1      | –                 | 1           | 11,6           | –                        | 340        | 420 | 38  | 2,1 | 1,5            | 4,3             | 361,5 | 394,7          | 368,2          |
| NJ1868-M1      | HJ1868            | 1           | 11,6           | 1,71                     | 340        | 420 | 38  | 2,1 | 1,5            | –               | 361,5 | 394,7          | 368,2          |
| NJ1868-M1A     | –                 | 1           | 11,6           | –                        | 340        | 420 | 38  | 2,1 | 1,5            | 4,3             | 361,5 | 394,7          | 368,2          |
| NJ1868-M1A     | HJ1868            | 1           | 11,6           | 1,71                     | 340        | 420 | 38  | 2,1 | 1,5            | –               | 361,5 | 394,7          | 368,2          |
| NJ2868-M1      | –                 | 1           | 15,3           | –                        | 340        | 420 | 48  | 2,1 | 1,5            | 5,3             | 361,5 | 394,7          | 368,2          |
| NUP2868-M1     | –                 | 1           | 15,6           | –                        | 340        | 420 | 48  | 2,1 | 1,5            | –               | 361,5 | 394,7          | 368,2          |
| NJ1968-E-M1    | –                 | 1           | 26,9           | –                        | 340        | 460 | 56  | 3   | 3              | 5,7             | 370   | 423,3          | 380,7          |
| NJ1968-E-M1    | HJ1968-E          | 1           | 26,9           | 4,09                     | 340        | 460 | 56  | 3   | 3              | –               | 370   | 423,3          | 380,7          |
| NJ1968-E-M1A   | –                 | 1           | 26,9           | –                        | 340        | 460 | 56  | 3   | 3              | 5,7             | 370   | 423,3          | 380,7          |
| NJ1968-E-M1A   | HJ1968-E          | 1           | 26,9           | 4,09                     | 340        | 460 | 56  | 3   | 3              | –               | 370   | 423,3          | 380,7          |
| NUP1968-E-MP1A | –                 | 1           | 27,1           | –                        | 340        | 460 | 56  | 3   | 3              | –               | 370   | 423,3          | 380,7          |
| NJ2968-M1      | –                 | 1           | 35,1           | –                        | 340        | 460 | 72  | 3   | 3              | 7               | 370   | 418            | 380            |
| NJ2968-M1      | HJ2968            | 1           | 35,1           | 4,02                     | 340        | 460 | 72  | 3   | 3              | –               | 370   | 418            | 380            |
| NJ2968-M1A     | –                 | 1           | 35,1           | –                        | 340        | 460 | 72  | 3   | 3              | 7               | 370   | 418            | 380            |
| NJ2968-M1A     | HJ2968            | 1           | 35,1           | 4,02                     | 340        | 460 | 72  | 3   | 3              | –               | 370   | 418            | 380            |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



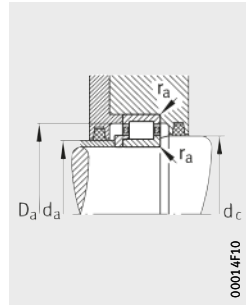
00014F12

2) Axial displacement "s" for NJ



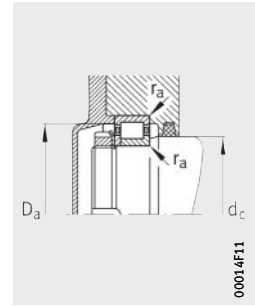
00014F0F

Mounting dimensions for NJ



00014F10

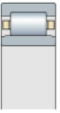
Mounting dimensions for NJ and HJ



00014F11

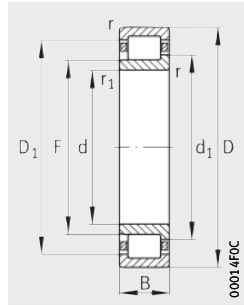
Mounting dimensions for NUP

|       |       |       | Mounting dimensions |       |       |                    |       |          | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|-------|-------|-------|---------------------|-------|-------|--------------------|-------|----------|---------------------|-------------------------|--------------------------------------|--|---|
| $B_1$ | $B_2$ | $B_3$ | $d_a$               |       | $d_c$ | $D_a$              | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
|       |       |       | min. <sup>1)</sup>  | max.  | min.  | max. <sup>1)</sup> | max.  | max.     |                     |                         |                                      |  |   |
| 18    | 31    | —     | 332                 | 346   | 365   | 428                | 2,5   | 2,5      | 620                 | 1100                    | 104                                  | 2 600  | —   |
| —     | —     | —     | 332                 | 346   | 365   | 428                | 2,5   | 2,5      | 620                 | 1100                    | 104                                  | 2 600  | —   |
| 18    | 31    | —     | 332                 | 346   | 365   | 428                | 2,5   | 2,5      | 620                 | 1100                    | 104                                  | 2 600  | —   |
| —     | —     | —     | 335                 | 356   | 380   | 465                | 3     | 3        | 915                 | 1500                    | 143                                  | 2 400  | 1 300   |
| 19    | 36    | —     | 335                 | 356   | 380   | 465                | 3     | 3        | 915                 | 1500                    | 143                                  | 2 400  | 1 300   |
| —     | —     | —     | 335                 | 356   | 380   | 465                | 3     | 3        | 915                 | 1500                    | 143                                  | 2 400  | 1 300   |
| 19    | 36    | —     | 335                 | 356   | 380   | 465                | 3     | 3        | 915                 | 1500                    | 143                                  | 2 400  | 1 300   |
| —     | —     | —     | 335                 | 356   | 380   | 465                | 3     | 3        | 915                 | 1500                    | 143                                  | 2 400  | 1 300   |
| 19    | 36    | —     | 335                 | 356   | 380   | 465                | 3     | 3        | 915                 | 1500                    | 143                                  | 2 400  | 1 300   |
| —     | —     | 17    | 335                 | 356   | 380   | 465                | 3     | 3        | 915                 | 1500                    | 144                                  | 2 400  | 1 300   |
| —     | —     | —     | 340                 | 388,5 | 419,6 | 560                | 4     | 4        | 1800                | 2700                    | 255                                  | 1 900  | 850   |
| 21    | 35    | —     | 340                 | 388,5 | 419,6 | 560                | 4     | 4        | 1800                | 2700                    | 255                                  | 1 900  | 850   |
| —     | —     | —     | 340                 | 388,5 | 419,6 | 560                | 4     | 4        | 1800                | 2700                    | 255                                  | 1 900  | 850   |
| 21    | 35    | —     | 340                 | 388,5 | 419,6 | 560                | 4     | 4        | 1800                | 2700                    | 255                                  | 1 900  | 850   |
| —     | —     | 14    | 340                 | 388,5 | 419,6 | 560                | 4     | 4        | 1800                | 2700                    | 255                                  | 1 900  | 850   |
| —     | —     | 14    | 340                 | 388,5 | 419,6 | 560                | 4     | 4        | 1800                | 2700                    | 255                                  | 1 900  | 850   |
| —     | —     | —     | 340                 | 376,5 | 411,7 | 560                | 4     | 4        | 3150                | 4900                    | 460                                  | 1 600  | 570   |
| 21    | 41    | —     | 340                 | 376,5 | 411,7 | 560                | 4     | 4        | 3150                | 4900                    | 460                                  | 1 600  | 570   |
| —     | —     | 20    | 340                 | 376,5 | 411,7 | 560                | 4     | 4        | 3150                | 4900                    | 460                                  | 1 600  | 560   |
| —     | —     | —     | 352                 | 415   | 455   | 638                | 6     | 6        | 2550                | 3750                    | 330                                  | 1 600  | 650   |
| —     | —     | —     | 350                 | 358   | 373   | 410                | 2,1   | 2,1      | 360                 | 735                     | 69                                   | 2 800  | —   |
| 12    | 21    | —     | 350                 | 358   | 373   | 410                | 2,1   | 2,1      | 360                 | 735                     | 69                                   | 2 800  | —   |
| —     | —     | —     | 350                 | 358   | 373   | 410                | 2,1   | 2,1      | 360                 | 735                     | 69                                   | 2 800  | —   |
| 12    | 21    | —     | 350                 | 358   | 373   | 410                | 2,1   | 2,1      | 360                 | 735                     | 69                                   | 2 800  | —   |
| —     | —     | —     | 350                 | 358   | 372   | 410                | 2     | 1,5      | 510                 | 1140                    | 112                                  | 2 600  | 1 100   |
| —     | —     | 9     | 350                 | 358   | 372   | 410                | 2     | 1,5      | 510                 | 1140                    | 112                                  | 2 600  | 1 100   |
| —     | —     | —     | 352                 | 366   | 385,4 | 446                | 2,5   | 2,5      | 695                 | 1250                    | 118                                  | 2 400  | —   |
| 20    | 32    | —     | 352                 | 366   | 385,4 | 446                | 2,5   | 2,5      | 695                 | 1250                    | 118                                  | 2 400  | —   |
| —     | —     | —     | 352                 | 366   | 385,4 | 446                | 2,5   | 2,5      | 695                 | 1250                    | 118                                  | 2 400  | —   |
| 20    | 32    | —     | 352                 | 366   | 385,4 | 446                | 2,5   | 2,5      | 695                 | 1250                    | 118                                  | 2 400  | —   |
| —     | —     | 12    | 352                 | 366   | 385,4 | 446                | 2,5   | 2,5      | 695                 | 1250                    | 118                                  | 2 400  | —   |
| —     | —     | —     | 352                 | 366   | 385   | 448                | 2,5   | 2,5      | 950                 | 1930                    | 190                                  | 2 400  | 950   |
| 20    | 32    | —     | 352                 | 366   | 385   | 448                | 2,5   | 2,5      | 950                 | 1930                    | 190                                  | 2 400  | 950   |
| —     | —     | —     | 352                 | 366   | 385   | 448                | 2,5   | 2,5      | 950                 | 1930                    | 190                                  | 2 400  | 950   |
| 20    | 32    | —     | 352                 | 366   | 385   | 448                | 2,5   | 2,5      | 950                 | 1930                    | 190                                  | 2 400  | 950   |

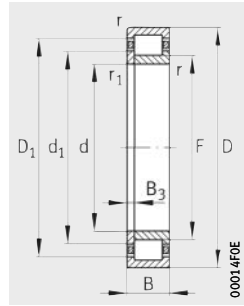


# Cylindrical roller bearings with cage

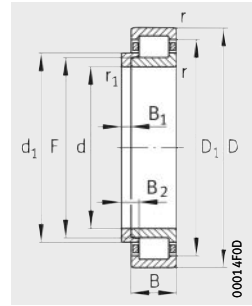
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing



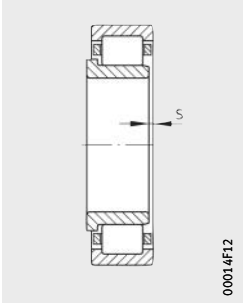
Design 1  
NJ and HJ  
Locating bearing

**Dimension table** (continued) · Dimensions in mm

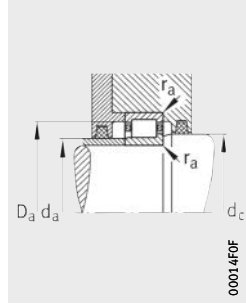
| Designation    |                   | De-<br>sign | Mass<br>m       |                           | Dimensions |     |     |      |                |                 |       |                |                |
|----------------|-------------------|-------------|-----------------|---------------------------|------------|-----|-----|------|----------------|-----------------|-------|----------------|----------------|
| Bearing        | L-section<br>ring |             | Bearing<br>≈ kg | L-section<br>ring<br>≈ kg | d          | D   | B   | r    | r <sub>1</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> | d <sub>1</sub> |
|                |                   |             |                 |                           |            |     |     | min. | min.           |                 |       | ≈              | ≈              |
| NJ1068-MPA     | –                 | 1           | 66,6            | –                         | 340        | 520 | 82  | 5    | 5              | 8,9             | 385   | 458,2          | 402,2          |
| NJ1068-MPA     | HJ1068            | 1           | 66,6            | 7,22                      | 340        | 520 | 82  | 5    | 5              | –               | 385   | 458,2          | 402,2          |
| NJ1068-M1      | –                 | 1           | 64,7            | –                         | 340        | 520 | 82  | 5    | 5              | 8,9             | 385   | 458,2          | 402,2          |
| NJ1068-M1      | HJ1068            | 1           | 64,7            | 7,22                      | 340        | 520 | 82  | 5    | 5              | –               | 385   | 458,2          | 402,2          |
| NJ1068-M1A     | –                 | 1           | 64,7            | –                         | 340        | 520 | 82  | 5    | 5              | 8,9             | 385   | 458,2          | 402,2          |
| NJ1068-M1A     | HJ1068            | 1           | 64,7            | 7,22                      | 340        | 520 | 82  | 5    | 5              | –               | 385   | 458,2          | 402,2          |
| NJ268-E-M1     | –                 | 1           | 135             | –                         | 340        | 620 | 92  | 6    | 6              | 7,4             | 419   | 526,4          | 442,9          |
| NJ268-E-M1     | HJ268-E           | 1           | 135             | 12,5                      | 340        | 620 | 92  | 6    | 6              | –               | 419   | 526,4          | 442,9          |
| NJ1872-M1      | –                 | 1           | 17,9            | –                         | 360        | 440 | 38  | 2,1  | 1,5            | 4,3             | 421   | 414,7          | 388,2          |
| NJ1872-M1      | HJ1872            | 1           | 17,9            | 1,8                       | 360        | 440 | 38  | 2,1  | 1,5            | –               | 421   | 414,7          | 388,2          |
| NJ2872-M1      | –                 | 1           | 15,7            | –                         | 360        | 440 | 48  | 2,1  | 1,5            | 5,4             | 381,5 | 414,7          | 388,2          |
| NUP2872-M1     | –                 | 1           | 16              | –                         | 360        | 440 | 48  | 2,1  | 1,5            | –               | 381,5 | 414,7          | 388,2          |
| NJ1972-M1      | –                 | 1           | 28,3            | –                         | 360        | 480 | 56  | 3    | 3              | 6,2             | 390   | 438,5          | 400            |
| NJ1972-M1      | HJ1972            | 1           | 28,3            | 4,28                      | 360        | 480 | 56  | 3    | 3              | –               | 390   | 438,5          | 400            |
| NJ1972-M1A     | –                 | 1           | 28,3            | –                         | 360        | 480 | 56  | 3    | 3              | 6,2             | 390   | 438,5          | 400            |
| NJ1972-M1A     | HJ1972            | 1           | 28,3            | 4,28                      | 360        | 480 | 56  | 3    | 3              | –               | 390   | 438,5          | 400            |
| NUP1972-M1A    | –                 | 1           | 29              | –                         | 360        | 480 | 56  | 3    | 3              | –               | 390   | 438,5          | 400            |
| NJ1072-M1      | –                 | 1           | 67,5            | –                         | 360        | 540 | 82  | 5    | 5              | 8,9             | 405   | 478,1          | 421,6          |
| NJ1072-M1      | HJ1072            | 1           | 67,5            | 7,38                      | 360        | 540 | 82  | 5    | 5              | –               | 405   | 478,1          | 421,6          |
| NJ1072-M1A     | –                 | 1           | 67,5            | –                         | 360        | 540 | 82  | 5    | 5              | 8,9             | 405   | 478,1          | 421,6          |
| NJ1072-M1A     | HJ1072            | 1           | 67,5            | 7,38                      | 360        | 540 | 82  | 5    | 5              | –               | 405   | 478,1          | 421,6          |
| NJ1072-MP1A    | –                 | 1           | 65,8            | –                         | 360        | 540 | 82  | 5    | 5              | 8,9             | 405   | 478,1          | 421,6          |
| NJ1072-MP1A    | HJ1072            | 1           | 65,8            | 7,38                      | 360        | 540 | 82  | 5    | 5              | –               | 405   | 478,1          | 421,6          |
| NUP1072-M1     | –                 | 1           | 69,1            | –                         | 360        | 540 | 82  | 5    | 5              | –               | 405   | 478,1          | 421,6          |
| NUP2072-E-M1   | –                 | 1           | 91,5            | –                         | 360        | 540 | 106 | 5    | 5              | –               | 405   | 483,8          | 422,7          |
| NUP2072-E-M1A  | –                 | 1           | 91,5            | –                         | 360        | 540 | 106 | 5    | 5              | –               | 405   | 483,8          | 422,7          |
| NUP2072-E-MP1A | –                 | 1           | 90              | –                         | 360        | 540 | 106 | 5    | 5              | –               | 405   | 483,8          | 422,7          |
| NUP2072-E-MPA  | –                 | 1           | 90              | –                         | 360        | 540 | 106 | 5    | 5              | –               | 405   | 483,8          | 422,7          |
| NJ272-E-M1     | –                 | 1           | 151             | –                         | 360        | 650 | 95  | 6    | 6              | 9,5             | 451   | 558,5          | 475            |
| NJ272-E-M1     | HJ272-E           | 1           | 151             | 14,9                      | 360        | 650 | 95  | 6    | 6              | –               | 451   | 558,5          | 475            |
| NJ2272-E-M1    | –                 | 1           | 258             | –                         | 360        | 650 | 170 | 6    | 6              | 15              | 428   | 562            | 457,5          |

<sup>1)</sup> Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

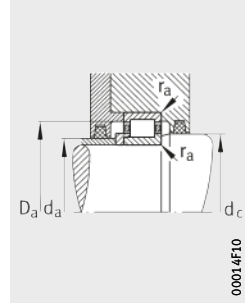




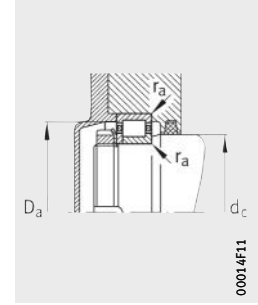
2) Axial displacement "s" for NJ



Mounting dimensions for NJ

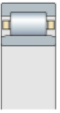


Mounting dimensions for NJ and HJ



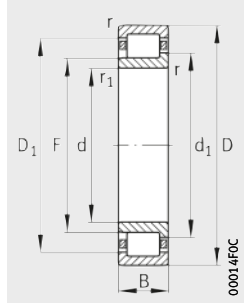
Mounting dimensions for NUP

|                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
|                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| -              | -              | -              | 357                 | 381  | 407            | 503                | 4              | 4               | 1 080               | 1 760                 | 163                | 2 200             | 1 200             |
| 21             | 39,5           | -              | 357                 | 381  | 407            | 503                | 4              | 4               | 1 080               | 1 760                 | 163                | 2 200             | 1 200             |
| -              | -              | -              | 357                 | 381  | 407            | 503                | 4              | 4               | 1 120               | 1 830                 | 169                | 2 200             | 1 200             |
| 21             | 39,5           | -              | 357                 | 381  | 407            | 503                | 4              | 4               | 1 120               | 1 830                 | 169                | 2 200             | 1 200             |
| -              | -              | -              | 357                 | 381  | 407            | 503                | 4              | 4               | 1 120               | 1 830                 | 169                | 2 200             | 1 200             |
| 21             | 39,5           | -              | 357                 | 381  | 407            | 503                | 4              | 4               | 1 120               | 1 830                 | 169                | 2 200             | 1 200             |
| -              | -              | -              | 366                 | 415  | 447            | 594                | 5              | 5               | 1 930               | 3 000                 | 280                | 1 800             | 750               |
| 22             | 36             | -              | 366                 | 415  | 447            | 594                | 5              | 5               | 1 930               | 3 000                 | 280                | 1 800             | 750               |
| -              | -              | -              | 370                 | 378  | 393            | 430                | 2              | 1,5             | 365                 | 765                   | 71                 | 2 600             | -                 |
| 12             | 21             | -              | 370                 | 378  | 393            | 430                | 2              | 1,5             | 365                 | 765                   | 71                 | 2 600             | -                 |
| -              | -              | -              | 370                 | 378  | 392            | 430                | 2              | 1,5             | 530                 | 1 220                 | 118                | 2 400             | 950               |
| -              | -              | 9              | 370                 | 378  | 392            | 430                | 2              | 1,5             | 530                 | 1 220                 | 118                | 2 400             | 950               |
| -              | -              | -              | 372                 | 386  | 405            | 468                | 2,5            | 2,5             | 655                 | 1 220                 | 114                | 2 400             | -                 |
| 20             | 33             | -              | 372                 | 386  | 405            | 468                | 2,5            | 2,5             | 655                 | 1 220                 | 114                | 2 400             | -                 |
| -              | -              | -              | 372                 | 386  | 405            | 468                | 2,5            | 2,5             | 655                 | 1 220                 | 114                | 2 400             | -                 |
| 20             | 33             | -              | 372                 | 386  | 405            | 468                | 2,5            | 2,5             | 655                 | 1 220                 | 114                | 2 400             | -                 |
| -              | -              | 13             | 372                 | 386  | 405            | 468                | 2,5            | 2,5             | 655                 | 1 220                 | 115                | 2 400             | -                 |
| -              | -              | -              | 377                 | 400  | 427            | 523                | 4              | 4               | 1 140               | 1 900                 | 175                | 2 200             | 1 100             |
| 21             | 39,5           | -              | 377                 | 400  | 427            | 523                | 4              | 4               | 1 140               | 1 900                 | 175                | 2 200             | 1 100             |
| -              | -              | -              | 377                 | 400  | 427            | 523                | 4              | 4               | 1 140               | 1 900                 | 175                | 2 200             | 1 100             |
| 21             | 39,5           | -              | 377                 | 400  | 427            | 523                | 4              | 4               | 1 140               | 1 900                 | 175                | 2 200             | 1 100             |
| -              | -              | -              | 377                 | 400  | 427            | 523                | 4              | 4               | 1 140               | 1 900                 | 175                | 2 200             | 1 100             |
| 21             | 39,5           | -              | 377                 | 400  | 427            | 523                | 4              | 4               | 1 140               | 1 900                 | 175                | 2 200             | 1 100             |
| -              | -              | 18,5           | 377                 | 400  | 427            | 523                | 4              | 4               | 1 140               | 1 900                 | 175                | 2 200             | 1 100             |
| -              | -              | 13             | 377                 | 401  | 427            | 523                | 4              | 4               | 2 000               | 3 750                 | 355                | 1 900             | 750               |
| -              | -              | 13             | 377                 | 401  | 427            | 523                | 4              | 4               | 2 000               | 3 750                 | 355                | 1 900             | 750               |
| -              | -              | 13             | 377                 | 401  | 427            | 523                | 4              | 4               | 2 000               | 3 750                 | 355                | 1 900             | 750               |
| -              | -              | 13             | 377                 | 401  | 427            | 523                | 4              | 4               | 2 000               | 3 750                 | 355                | 1 900             | 750               |
| -              | -              | -              | 386                 | 447  | 479            | 624                | 5              | 5               | 2 000               | 3 150                 | 290                | 1 600             | 700               |
| 22             | 37,5           | -              | 386                 | 447  | 479            | 624                | 5              | 5               | 2 000               | 3 150                 | 290                | 1 600             | 700               |
| -              | -              | -              | 386                 | 424  | 462            | 624                | 5              | 5               | 3 600               | 5 700                 | 520                | 1 400             | 500               |

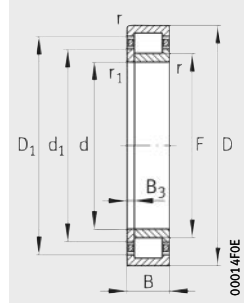


# Cylindrical roller bearings with cage

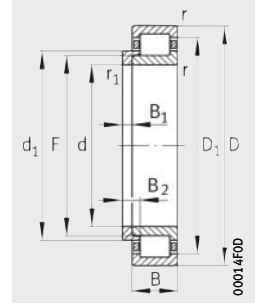
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

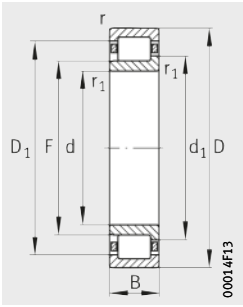


Design 1  
NJ and HJ  
Locating bearing

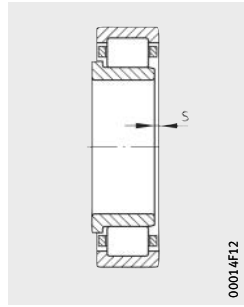
Dimension table (continued) · Dimensions in mm

| Designation  |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |     |      |     |                |                 |       |                |                |
|--------------|-------------------|-------------|----------------|--------------------------|------------|-----|------|-----|----------------|-----------------|-------|----------------|----------------|
| Bearing      | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D   | B    | r   | r <sub>1</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> | d <sub>1</sub> |
|              |                   |             |                |                          |            |     |      |     |                |                 |       |                |                |
|              |                   |             |                |                          |            |     |      |     |                |                 |       |                |                |
|              |                   |             |                |                          |            |     |      |     |                |                 |       |                |                |
| NJ1876-M1    | –                 | 1           | 19,6           | –                        | 380        | 480 | 46   | 2,1 | 2,1            | 5,3             | 407,5 | 447,4          | 415,5          |
| NJ1876-M1    | HJ1876            | 1           | 19,6           | 2,82                     | 380        | 480 | 46   | 2,1 | 2,1            | –               | 407,5 | 447,4          | 415,5          |
| NJ1876-MP1A  | –                 | 1           | 19,6           | –                        | 380        | 480 | 46   | 2,1 | 2,1            | 5,3             | 407,5 | 447,4          | 415,5          |
| NJ1876-MP1A  | HJ1876            | 1           | 19,6           | 2,82                     | 380        | 480 | 46   | 2,1 | 2,1            | –               | 407,5 | 447,4          | 415,5          |
| NUP1876-M1   | –                 | 1           | 20,1           | –                        | 380        | 480 | 46   | 2,1 | 2,1            | –               | 407,5 | 447,4          | 415,5          |
| NJ2876-M1    | –                 | 1           | 25,9           | –                        | 380        | 480 | 60   | 2,1 | 2,1            | 6,9             | 407,5 | 447,4          | 415,5          |
| NJ2876-M1A   | –                 | 1           | 25,9           | –                        | 380        | 480 | 60   | 2,1 | 2,1            | 6,9             | 407,5 | 447,4          | 415,5          |
| NUP2876-M1   | –                 | 1           | 26,4           | –                        | 380        | 480 | 60   | 2,1 | 2,1            | –               | 407,5 | 447,4          | 415,5          |
| NUP2876-M1A  | –                 | 1           | 26,4           | –                        | 380        | 480 | 60   | 2,1 | 2,1            | –               | 407,5 | 447,4          | 415,5          |
| NJ2976-M1    | –                 | 1           | 53,8           | –                        | 380        | 520 | 82   | 4   | 4              | 7,2             | 414   | 471,6          | 425,9          |
| NUP2976-M1   | –                 | 1           | 54,5           | –                        | 380        | 520 | 82   | 4   | 4              | –               | 414   | 471,6          | 425,9          |
| NJ1076-M1    | –                 | 1           | 70,7           | –                        | 380        | 560 | 82   | 5   | 5              | 9               | 425   | 498,1          | 441,6          |
| NJ1076-M1    | HJ1076            | 1           | 70,7           | 7,86                     | 380        | 560 | 82   | 5   | 5              | –               | 425   | 498,1          | 441,6          |
| NJ1076-M1A   | –                 | 1           | 70,7           | –                        | 380        | 560 | 82   | 5   | 5              | 9               | 425   | 498,1          | 441,6          |
| NJ1076-M1A   | HJ1076            | 1           | 70,7           | 7,86                     | 380        | 560 | 82   | 5   | 5              | –               | 425   | 498,1          | 441,6          |
| NJ1076-MP1A  | –                 | 1           | 68,7           | –                        | 380        | 560 | 82   | 5   | 5              | 9               | 425   | 498,1          | 441,6          |
| NJ1076-MP1A  | HJ1076            | 1           | 68,7           | 7,86                     | 380        | 560 | 82   | 5   | 5              | –               | 425   | 498,1          | 441,6          |
| NJ2276-E-M1  | –                 | 1           | 292            | –                        | 380        | 680 | 175  | 6   | 6              | 13,8            | 451   | 588,8          | 481            |
| NJ2276-E-M1  | HJ2276-E          | 1           | 292            | 17,3                     | 380        | 680 | 175  | 6   | 6              | –               | 451   | 588,8          | 481            |
| Z-544425.ZL  | –                 | 2 NJ        | 37,4           | –                        | 381        | 508 | 63,5 | 5   | 3              | –               | 407   | 469,3          | 421,8          |
| NJ1880-M1    | –                 | 1           | 20,8           | –                        | 400        | 500 | 46   | 2,1 | 2,1            | 5,3             | 428   | 468            | 436            |
| NJ1880-M1    | HJ1880            | 1           | 20,8           | 3,18                     | 400        | 500 | 46   | 2,1 | 2,1            | –               | 428   | 468            | 436            |
| NUP2880-M1   | –                 | 1           | 28,4           | –                        | 400        | 500 | 60   | 2,1 | 2,1            | –               | 428   | 468            | 436            |
| NJ1980-M1    | –                 | 1           | 42,9           | –                        | 400        | 540 | 65   | 4   | 4              | 7,2             | 436   | 492,7          | 447,3          |
| NJ1980-M1    | HJ1980            | 1           | 42,9           | 6,22                     | 400        | 540 | 65   | 4   | 4              | –               | 436   | 492,7          | 447,3          |
| NJ1980-M1A   | –                 | 1           | 42,9           | –                        | 400        | 540 | 65   | 4   | 4              | 7,2             | 436   | 492,7          | 447,3          |
| NJ1980-M1A   | HJ1980            | 1           | 42,9           | 6,22                     | 400        | 540 | 65   | 4   | 4              | –               | 436   | 492,7          | 447,3          |
| NJ2980-M1    | –                 | 1           | 56,1           | –                        | 400        | 540 | 82   | 4   | 4              | 7,2             | 434   | 494            | 445,9          |
| NJ2980-MP1A  | –                 | 1           | 54,9           | –                        | 400        | 540 | 82   | 4   | 4              | 7,2             | 434   | 494            | 445,9          |
| NJ1080-M1    | –                 | 1           | 92,2           | –                        | 400        | 600 | 90   | 5   | 5              | 9,5             | 450   | 531,5          | 469            |
| NJ1080-M1    | HJ1080            | 1           | 92,2           | 10,3                     | 400        | 600 | 90   | 5   | 5              | –               | 450   | 531,5          | 469            |
| NJ1080-M1A   | –                 | 1           | 92,2           | –                        | 400        | 600 | 90   | 5   | 5              | 9,5             | 450   | 531,5          | 469            |
| NJ1080-M1A   | HJ1080            | 1           | 92,2           | 10,3                     | 400        | 600 | 90   | 5   | 5              | –               | 450   | 531,5          | 469            |
| NUP1080-M1   | –                 | 1           | 94,4           | –                        | 400        | 600 | 90   | 5   | 5              | –               | 450   | 531,5          | 469            |
| NUP2080-E-M1 | –                 | 1           | 126            | –                        | 400        | 600 | 118  | 5   | 5              | –               | 450   | 533,6          | 469,7          |

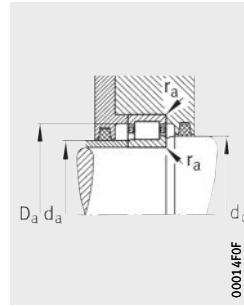
1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



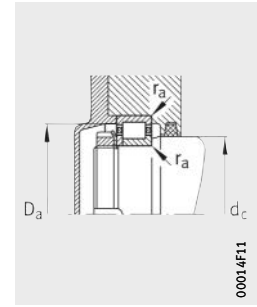
Design 2  
NJ  
Semi-locating bearing



2) Axial displacement "s" for NJ



Mounting dimensions  
for NJ and HJ, page 363



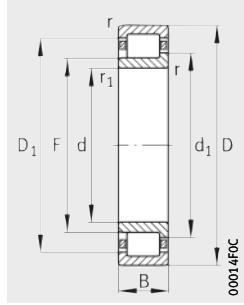
Mounting dimensions  
for NUP

|                |                |                | Mounting dimensions |      |                |                |                |                 | Basic load ratings           |                                | Fatigue limit load    | Limiting speed                      | Reference speed                     |
|----------------|----------------|----------------|---------------------|------|----------------|----------------|----------------|-----------------|------------------------------|--------------------------------|-----------------------|-------------------------------------|-------------------------------------|
| B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub> | r <sub>a</sub> | r <sub>a1</sub> | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | C <sub>ur</sub><br>kN | n <sub>G</sub><br>min <sup>-1</sup> | n <sub>B</sub><br>min <sup>-1</sup> |
|                |                |                | min. <sup>1)</sup>  | max. |                |                |                |                 |                              |                                |                       |                                     |                                     |
| -              | -              | -              | 390                 | 404  | 420            | 470            | 2              | 2               | 490                          | 1 000                          | 91                    | 2 400                               | -                                   |
| 14             | 25             | -              | 390                 | 404  | 420            | 470            | 2              | 2               | 490                          | 1 000                          | 91                    | 2 400                               | -                                   |
| -              | -              | -              | 390                 | 404  | 420            | 470            | 2              | 2               | 490                          | 1 000                          | 91                    | 2 400                               | -                                   |
| 14             | 25             | -              | 390                 | 404  | 420            | 470            | 2              | 2               | 490                          | 1 000                          | 91                    | 2 400                               | -                                   |
| -              | -              | 11             | 390                 | 404  | 420            | 470            | 2              | 2               | 490                          | 1 000                          | 91                    | 2 400                               | -                                   |
| -              | -              | -              | 390                 | 404  | 420            | 470            | 2              | 2               | 695                          | 1 560                          | 148                   | 2 200                               | 900                                 |
| -              | -              | -              | 390                 | 404  | 420            | 470            | 2              | 2               | 695                          | 1 560                          | 148                   | 2 200                               | 900                                 |
| -              | -              | 12             | 390                 | 404  | 420            | 470            | 2              | 2               | 695                          | 1 560                          | 148                   | 2 200                               | 900                                 |
| -              | -              | 12             | 390                 | 404  | 420            | 470            | 2              | 2               | 695                          | 1 560                          | 148                   | 2 200                               | 900                                 |
| -              | -              | -              | 395                 | 410  | 432            | 505            | 3              | 3               | 1 320                        | 2 700                          | 255                   | 2 000                               | 800                                 |
| -              | -              | 12             | 395                 | 410  | 432            | 505            | 3              | 3               | 1 320                        | 2 700                          | 255                   | 2 000                               | 800                                 |
| -              | -              | -              | 397                 | 420  | 447            | 543            | 4              | 4               | 1 180                        | 2 000                          | 180                   | 2 000                               | 1 000                               |
| 21             | 39,5           | -              | 397                 | 420  | 447            | 543            | 4              | 4               | 1 180                        | 2 000                          | 180                   | 2 000                               | 1 000                               |
| -              | -              | -              | 397                 | 420  | 447            | 543            | 4              | 4               | 1 180                        | 2 000                          | 180                   | 2 000                               | 1 000                               |
| 21             | 39,5           | -              | 397                 | 420  | 447            | 543            | 4              | 4               | 1 180                        | 2 000                          | 180                   | 2 000                               | 1 000                               |
| -              | -              | -              | 397                 | 420  | 447            | 543            | 4              | 4               | 1 180                        | 2 000                          | 180                   | 2 000                               | 1 000                               |
| 21             | 39,5           | -              | 397                 | 420  | 447            | 543            | 4              | 4               | 1 180                        | 2 000                          | 180                   | 2 000                               | 1 000                               |
| -              | -              | -              | 406                 | 446  | 484            | 654            | 5              | 5               | 4 050                        | 6 700                          | 610                   | 1 400                               | 450                                 |
| 25             | 50             | -              | 406                 | 446  | 484            | 654            | 5              | 5               | 4 050                        | 6 700                          | 610                   | 1 400                               | 450                                 |
| -              | -              | -              | 393                 | 403  | 427            | 491            | 4              | 2,5             | 1 020                        | 1 860                          | 150                   | 2 000                               | 800                                 |
| -              | -              | -              | 410                 | 424  | 441            | 490            | 2,1            | 2,1             | 520                          | 1 100                          | 98                    | 2 400                               | -                                   |
| 15             | 26             | -              | 410                 | 424  | 441            | 490            | 2,1            | 2,1             | 520                          | 1 100                          | 98                    | 2 400                               | -                                   |
| -              | -              | 12             | 410                 | 424  | 441            | 490            | 2              | 2               | 735                          | 1 700                          | 159                   | 2 200                               | 850                                 |
| -              | -              | -              | 415                 | 432  | 453            | 525            | 3              | 3               | 800                          | 1 500                          | 141                   | 2 200                               | -                                   |
| 22             | 37,5           | -              | 415                 | 432  | 453            | 525            | 3              | 3               | 800                          | 1 500                          | 141                   | 2 200                               | -                                   |
| -              | -              | -              | 415                 | 432  | 453            | 525            | 3              | 3               | 800                          | 1 500                          | 141                   | 2 200                               | -                                   |
| 22             | 37,5           | -              | 415                 | 432  | 453            | 525            | 3              | 3               | 800                          | 1 500                          | 141                   | 2 200                               | -                                   |
| -              | -              | -              | 415                 | 430  | 452            | 525            | 3              | 3               | 1 340                        | 2 750                          | 265                   | 2 000                               | 750                                 |
| -              | -              | -              | 415                 | 430  | 452            | 525            | 3              | 3               | 1 340                        | 2 750                          | 265                   | 2 000                               | 750                                 |
| -              | -              | -              | 417                 | 445  | 474            | 583            | 4              | 4               | 1 370                        | 2 320                          | 212                   | 1 900                               | 950                                 |
| 23             | 43             | -              | 417                 | 445  | 474            | 583            | 4              | 4               | 1 370                        | 2 320                          | 212                   | 1 900                               | 950                                 |
| -              | -              | -              | 417                 | 445  | 474            | 583            | 4              | 4               | 1 370                        | 2 320                          | 212                   | 1 900                               | 950                                 |
| 23             | 43             | -              | 417                 | 445  | 474            | 583            | 4              | 4               | 1 370                        | 2 320                          | 212                   | 1 900                               | 950                                 |
| -              | -              | 20             | 417                 | 445  | 474            | 583            | 4              | 4               | 1 370                        | 2 320                          | 212                   | 1 900                               | 950                                 |
| -              | -              | 16,5           | 417                 | 446  | 476            | 583            | 4              | 4               | 2 280                        | 4 400                          | 415                   | 1 800                               | 670                                 |

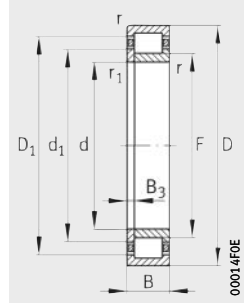


# Cylindrical roller bearings with cage

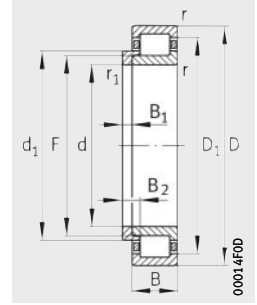
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

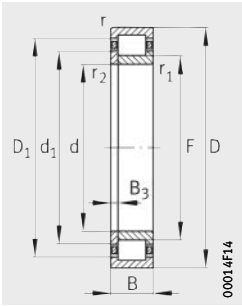


Design 1  
NJ and HJ  
Locating bearing

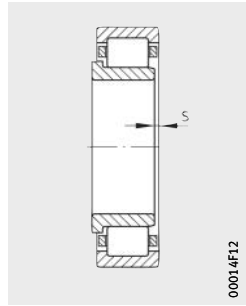
**Dimension table** (continued) · Dimensions in mm

| Designation   |                   | De-<br>sign | Mass<br>m |                   | Dimensions |         |        |     |                                |                 |       |                |
|---------------|-------------------|-------------|-----------|-------------------|------------|---------|--------|-----|--------------------------------|-----------------|-------|----------------|
| Bearing       | L-section<br>ring |             | Bearing   | L-section<br>ring | d          | D       | B      | r   | r <sub>1</sub> /r <sub>2</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> |
|               |                   |             | ≈kg       | ≈kg               |            |         |        |     | min.                           |                 |       |                |
| NUP2080-E-M1A | –                 | 1           | 126       | –                 | 400        | 600     | 118    | 5   | 5                              | –               | 450   | 533,6          |
| NJ2280-E-M1   | –                 | 1           | 342       | –                 | 400        | 720     | 105    | 6   | 6                              | 15              | 471   | 630,5          |
| Z-545999.ZL   | –                 | 2 NUP       | 29,6      | –                 | 404,6      | 508     | 60,325 | 5   | 5                              | –               | 427,2 | 477,2          |
| NJ1884-MPA    | –                 | 1           | 22,5      | –                 | 420        | 520     | 46     | 2,1 | 2,1                            | 5,3             | 448   | 488            |
| NJ1884-MPA    | HJ1884            | 1           | 22,5      | 3,33              | 420        | 520     | 46     | 2,1 | 2,1                            | –               | 448   | 488            |
| NJ1884-M1     | –                 | 1           | 21,4      | –                 | 420        | 520     | 46     | 2,1 | 2,1                            | 5,3             | 448   | 488            |
| NJ1884-M1     | HJ1884            | 1           | 21,4      | 3,33              | 420        | 520     | 46     | 2,1 | 2,1                            | –               | 448   | 488            |
| NJ1884-M1A    | –                 | 1           | 21,4      | –                 | 420        | 520     | 46     | 2,1 | 2,1                            | 5,3             | 448   | 488            |
| NJ1884-M1A    | HJ1884            | 1           | 21,4      | 3,33              | 420        | 520     | 46     | 2,1 | 2,1                            | –               | 448   | 488            |
| NJ2884-M1     | –                 | 1           | 25,1      | –                 | 420        | 520     | 60     | 2,1 | 2,1                            | 6,9             | 448   | 488            |
| NUP2884-M1    | –                 | 1           | 27,8      | –                 | 420        | 520     | 60     | 2,1 | 2,1                            | –               | 448   | 488            |
| NJ1984-M1     | –                 | 1           | 45,2      | –                 | 420        | 560     | 65     | 4   | 4                              | 7,2             | 456   | 510,4          |
| NJ1984-M1     | HJ1984            | 1           | 45,2      | 6,51              | 420        | 560     | 65     | 4   | 4                              | –               | 456   | 510,4          |
| NJ1984-M1A    | –                 | 1           | 45,2      | –                 | 420        | 560     | 65     | 4   | 4                              | 7,2             | 456   | 510,4          |
| NJ1984-M1A    | HJ1984            | 1           | 45,2      | 6,51              | 420        | 560     | 65     | 4   | 4                              | –               | 456   | 510,4          |
| NJ2984-M1     | –                 | 1           | 59,4      | –                 | 420        | 560     | 82     | 4   | 4                              | 6               | 454   | 511,6          |
| NJ2984-M1A    | –                 | 1           | 59,4      | –                 | 420        | 560     | 82     | 4   | 4                              | 6               | 454   | 511,6          |
| NUP2984-M1    | –                 | 1           | 60,6      | –                 | 420        | 560     | 82     | 4   | 4                              | –               | 454   | 511,6          |
| NJ1084-M1     | –                 | 1           | 95,1      | –                 | 420        | 620     | 90     | 5   | 5                              | 15              | 470   | 551,5          |
| NJ1084-M1     | HJ1084            | 1           | 95,1      | 10,7              | 420        | 620     | 90     | 5   | 5                              | –               | 470   | 551,5          |
| NJ1084-M1A    | –                 | 1           | 95,1      | –                 | 420        | 620     | 90     | 5   | 5                              | 15              | 470   | 551,5          |
| NJ1084-M1A    | HJ1084            | 1           | 95,1      | 10,7              | 420        | 620     | 90     | 5   | 5                              | –               | 470   | 551,5          |
| Z-544003.ZL   | –                 | 2 NUP       | 49,9      | –                 | 431,762    | 558,825 | 73,025 | 4   | 7,5/4                          | –               | 456,7 | 510            |
| NJ1888-M1     | –                 | 1           | 22,7      | –                 | 440        | 540     | 46     | 2,1 | 2,1                            | 5,3             | 468   | 508            |
| NJ1888-M1     | HJ1888            | 1           | 22,7      | 3,48              | 440        | 540     | 46     | 2,1 | 2,1                            | –               | 468   | 508            |
| NJ1888-M1A    | –                 | 1           | 22,7      | –                 | 440        | 540     | 46     | 2,1 | 2,1                            | 5,3             | 468   | 508            |
| NJ1888-M1A    | HJ1888            | 1           | 22,7      | 3,48              | 440        | 540     | 46     | 2,1 | 2,1                            | –               | 468   | 508            |
| NJ2888-M1     | –                 | 1           | 30        | –                 | 440        | 540     | 60     | 2,1 | 2,1                            | 6,9             | 468   | 508            |
| NJ2888-M1A    | –                 | 1           | 30        | –                 | 440        | 540     | 60     | 2,1 | 2,1                            | 6,9             | 468   | 508            |
| NUP2888-M1    | –                 | 1           | 30,6      | –                 | 440        | 540     | 60     | 2,1 | 2,1                            | –               | 468   | 508            |
| NUP2888-M1A   | –                 | 1           | 30,6      | –                 | 440        | 540     | 60     | 2,1 | 2,1                            | –               | 468   | 508            |
| NUP2888-MP1A  | –                 | 1           | 29,8      | –                 | 440        | 540     | 60     | 2,1 | 2,1                            | –               | 468   | 508            |
| NJ2988-M1     | –                 | 1           | 82,2      | –                 | 440        | 600     | 95     | 4   | 4                              | 8,7             | 480   | 545,6          |
| NJ2988-M1     | HJ2988            | 1           | 82,2      | 8,38              | 440        | 600     | 95     | 4   | 4                              | –               | 480   | 545,6          |
| NJ2988-M1A    | –                 | 1           | 82,2      | –                 | 440        | 600     | 95     | 4   | 4                              | 8,7             | 480   | 545,6          |

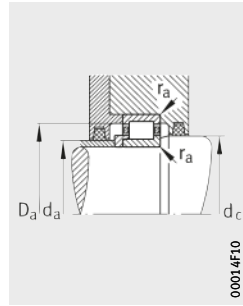
<sup>1)</sup> Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



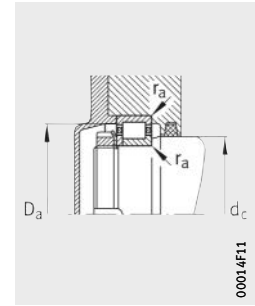
Design 2  
NUP  
Locating bearing



2) Axial displacement "s" for NJ



Mounting dimensions  
for NJ and HJ  
for NJ, page 361



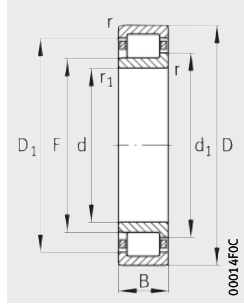
Mounting dimensions  
for NUP

|                |                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 469,7          | -              | -              | 16,5           | 417                 | 446  | 476            | 583                | 4              | 4               | 2 280               | 4 400                 | 415                | 1 800             | 670               |
| -              | -              | -              | -              | 426                 | 467  | 508            | 694                | 5              | 5               | 5 600               | 7 600                 | 670                | 1 300             | 850               |
| 438,8          | -              | -              | 9,2            | -                   | -    | -              | -                  | 4              | 4               | 915                 | 1 930                 | 157                | 2 000             | 750               |
| 456            | -              | -              | -              | 430                 | 444  | 461            | 510                | 2              | 2               | 520                 | 1 100                 | 97                 | 2 200             | -                 |
| 456            | 15             | 26             | -              | 430                 | 444  | 461            | 510                | 2              | 2               | 520                 | 1 100                 | 97                 | 2 200             | -                 |
| 456            | -              | -              | -              | 430                 | 444  | 461            | 510                | 2              | 2               | 530                 | 1 140                 | 101                | 2 200             | -                 |
| 456            | 15             | 26             | -              | 430                 | 444  | 461            | 510                | 2              | 2               | 530                 | 1 140                 | 101                | 2 200             | -                 |
| 456            | -              | -              | -              | 430                 | 444  | 461            | 510                | 2              | 2               | 530                 | 1 140                 | 101                | 2 200             | -                 |
| 456            | 15             | 26             | -              | 430                 | 444  | 461            | 510                | 2              | 2               | 530                 | 1 140                 | 101                | 2 200             | -                 |
| 456            | -              | -              | -              | 430                 | 444  | 461            | 510                | 2              | 2               | 750                 | 1 760                 | 164                | 2 000             | 800               |
| 456            | -              | -              | 12             | 430                 | 444  | 461            | 510                | 2              | 2               | 750                 | 1 760                 | 164                | 2 000             | 800               |
| 467,3          | -              | -              | -              | 435                 | 452  | 473            | 545                | 3              | 3               | 830                 | 1 600                 | 148                | 2 000             | -                 |
| 467,3          | 22             | 37,5           | -              | 435                 | 452  | 473            | 545                | 3              | 3               | 830                 | 1 600                 | 148                | 2 000             | -                 |
| 467,3          | -              | -              | -              | 435                 | 452  | 473            | 545                | 3              | 3               | 830                 | 1 600                 | 148                | 2 000             | -                 |
| 467,3          | 22             | 37,5           | -              | 435                 | 452  | 473            | 545                | 3              | 3               | 830                 | 1 600                 | 148                | 2 000             | -                 |
| 465,9          | -              | -              | -              | 435                 | 450  | 472            | 545                | 3              | 3               | 1 370               | 2 900                 | 275                | 1 900             | 700               |
| 465,9          | -              | -              | -              | 435                 | 450  | 472            | 545                | 3              | 3               | 1 370               | 2 900                 | 275                | 1 900             | 700               |
| 465,9          | -              | -              | 12             | 435                 | 450  | 472            | 545                | 3              | 3               | 1 370               | 2 900                 | 275                | 1 900             | 700               |
| 489            | -              | -              | -              | 437                 | 465  | 494            | 603                | 4              | 4               | 1 400               | 2 450                 | 219                | 1 800             | 900               |
| 489            | 23             | 43             | -              | 437                 | 465  | 494            | 603                | 4              | 4               | 1 400               | 2 450                 | 219                | 1 800             | 900               |
| 489            | -              | -              | -              | 437                 | 465  | 494            | 603                | 4              | 4               | 1 400               | 2 450                 | 219                | 1 800             | 900               |
| 489            | 23             | 43             | -              | 437                 | 465  | 494            | 603                | 4              | 4               | 1 400               | 2 450                 | 219                | 1 800             | 900               |
| 469,1          | -              | -              | 10,5           | -                   | -    | -              | -                  | 3              | 6/3             | 1 180               | 2 600                 | 241                | 1 900             | 630               |
| 476            | -              | -              | -              | 450                 | 464  | 481            | 530                | 2              | 2               | 540                 | 1 200                 | 104                | 2 200             | -                 |
| 476            | 15             | 26             | -              | 450                 | 464  | 481            | 530                | 2              | 2               | 540                 | 1 200                 | 104                | 2 200             | -                 |
| 476            | -              | -              | -              | 450                 | 464  | 481            | 530                | 2              | 2               | 540                 | 1 200                 | 104                | 2 200             | -                 |
| 476            | 15             | 26             | -              | 450                 | 464  | 481            | 530                | 2              | 2               | 540                 | 1 200                 | 104                | 2 200             | -                 |
| 476            | -              | -              | -              | 450                 | 464  | 481            | 530                | 2              | 2               | 765                 | 1 830                 | 168                | 2 000             | 750               |
| 476            | -              | -              | -              | 450                 | 464  | 481            | 530                | 2              | 2               | 765                 | 1 830                 | 168                | 2 000             | 750               |
| 476            | -              | -              | 12             | 450                 | 464  | 481            | 530                | 2              | 2               | 765                 | 1 830                 | 168                | 2 000             | 750               |
| 476            | -              | -              | 12             | 450                 | 464  | 481            | 530                | 2              | 2               | 765                 | 1 830                 | 168                | 2 000             | 750               |
| 476            | -              | -              | 12             | 450                 | 464  | 481            | 530                | 2              | 2               | 765                 | 1 830                 | 168                | 2 000             | 750               |
| 493,3          | -              | -              | -              | 455                 | 476  | 500            | 585                | 3              | 3               | 1 630               | 3 450                 | 320                | 1 800             | 670               |
| 493,3          | 24             | 39             | -              | 455                 | 476  | 500            | 585                | 3              | 3               | 1 630               | 3 450                 | 320                | 1 800             | 670               |
| 493,3          | -              | -              | -              | 455                 | 476  | 500            | 585                | 3              | 3               | 1 630               | 3 450                 | 320                | 1 800             | 670               |

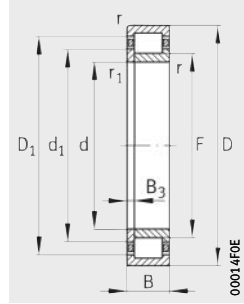


# Cylindrical roller bearings with cage

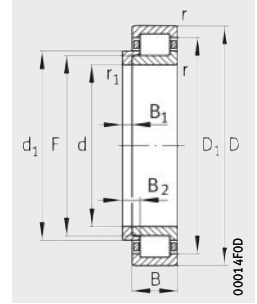
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

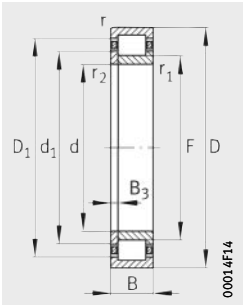


Design 1  
NJ and HJ  
Locating bearing

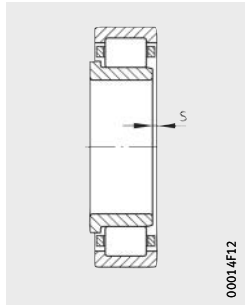
**Dimension table (continued)** · Dimensions in mm

| Designation        |                   | De-<br>sign | Mass<br>m       |                           | Dimensions   |       |       |      |                                |                 |       |                |
|--------------------|-------------------|-------------|-----------------|---------------------------|--------------|-------|-------|------|--------------------------------|-----------------|-------|----------------|
| Bearing            | L-section<br>ring |             | Bearing<br>≈ kg | L-section<br>ring<br>≈ kg | d            | D     | B     | r    | r <sub>1</sub> /r <sub>2</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> |
|                    |                   |             |                 |                           |              |       | min.  | min. |                                |                 |       | ≈              |
| <b>NJ2988-M1A</b>  | <b>HJ2988</b>     | 1           | 82,2            | 8,38                      | <b>440</b>   | 600   | 95    | 4    | 4                              | –               | 480   | 545,6          |
| <b>NUP2988-M1</b>  | –                 | 1           | 83,4            | –                         | <b>440</b>   | 600   | 95    | 4    | 4                              | –               | 480   | 545,6          |
| <b>NJ1088-M1</b>   | –                 | 1           | 110             | –                         | <b>440</b>   | 650   | 94    | 6    | 6                              | 9,8             | 493   | 577,6          |
| <b>NJ1088-M1</b>   | <b>HJ1088</b>     | 1           | 110             | 12,6                      | <b>440</b>   | 650   | 94    | 6    | 6                              | –               | 493   | 577,6          |
| <b>NJ1088-M1A</b>  | –                 | 1           | 110             | –                         | <b>440</b>   | 650   | 94    | 6    | 6                              | 9,8             | 493   | 577,6          |
| <b>NJ1088-M1A</b>  | <b>HJ1088</b>     | 1           | 110             | 12,6                      | <b>440</b>   | 650   | 94    | 6    | 6                              | –               | 493   | 577,6          |
| <b>NJ1892-M1</b>   | –                 | 1           | 34,9            | –                         | <b>460</b>   | 580   | 56    | 3    | 3                              | 6,6             | 494   | 540,5          |
| <b>NJ1892-M1</b>   | <b>HJ1892</b>     | 1           | 34,9            | 5,33                      | <b>460</b>   | 580   | 56    | 3    | 3                              | –               | 494   | 540,5          |
| <b>NJ1892-M1A</b>  | –                 | 1           | 34,9            | –                         | <b>460</b>   | 580   | 56    | 3    | 3                              | 6,6             | 494   | 540,5          |
| <b>NJ1892-M1A</b>  | <b>HJ1892</b>     | 1           | 34,9            | 5,33                      | <b>460</b>   | 580   | 56    | 3    | 3                              | –               | 494   | 540,5          |
| <b>NJ2892-M1</b>   | –                 | 1           | 46,6            | –                         | <b>460</b>   | 580   | 72    | 3    | 3                              | 8               | 494   | 540,5          |
| <b>NJ2892-M1A</b>  | –                 | 1           | 46,6            | –                         | <b>460</b>   | 580   | 72    | 3    | 3                              | 8               | 494   | 540,5          |
| <b>NUP2892-M1</b>  | –                 | 1           | 47,4            | –                         | <b>460</b>   | 580   | 72    | 3    | 3                              | –               | 494   | 540,5          |
| <b>NUP2892-M1A</b> | –                 | 1           | 47,4            | –                         | <b>460</b>   | 580   | 72    | 3    | 3                              | –               | 494   | 540,5          |
| <b>NJ1992-M1</b>   | –                 | 1           | 64,4            | –                         | <b>460</b>   | 620   | 74    | 4    | 4                              | 8,4             | 502   | 562,8          |
| <b>NJ1992-M1</b>   | <b>HJ1992</b>     | 1           | 64,4            | 9,03                      | <b>460</b>   | 620   | 74    | 4    | 4                              | –               | 502   | 562,8          |
| <b>NJ1992-M1A</b>  | –                 | 1           | 64,4            | –                         | <b>460</b>   | 620   | 74    | 4    | 4                              | 8,4             | 502   | 562,8          |
| <b>NJ1992-M1A</b>  | <b>HJ1992</b>     | 1           | 64,4            | 9,03                      | <b>460</b>   | 620   | 74    | 4    | 4                              | –               | 502   | 562,8          |
| <b>NUP1992-M1</b>  | –                 | 1           | 66              | –                         | <b>460</b>   | 620   | 74    | 4    | 4                              | –               | 502   | 562,8          |
| <b>NJ2992-M1</b>   | –                 | 1           | 85,2            | –                         | <b>460</b>   | 620   | 95    | 4    | 4                              | 8,7             | 500   | 564            |
| <b>NJ2992-M1</b>   | <b>HJ2992</b>     | 1           | 85,2            | 8,73                      | <b>460</b>   | 620   | 95    | 4    | 4                              | –               | 500   | 564            |
| <b>NUP2992-M1</b>  | –                 | 1           | 86,5            | –                         | <b>460</b>   | 620   | 95    | 4    | 4                              | –               | 500   | 564            |
| <b>NJ1092-M1</b>   | –                 | 1           | 128             | –                         | <b>460</b>   | 680   | 100   | 6    | 6                              | 11,2            | 516   | 603,9          |
| <b>NJ1092-M1</b>   | <b>HJ1092</b>     | 1           | 128             | 14,2                      | <b>460</b>   | 680   | 100   | 6    | 6                              | –               | 516   | 603,9          |
| <b>NJ1092-M1A</b>  | –                 | 1           | 128             | –                         | <b>460</b>   | 680   | 100   | 6    | 6                              | 11,2            | 516   | 603,9          |
| <b>NJ1092-M1A</b>  | <b>HJ1092</b>     | 1           | 128             | 14,2                      | <b>460</b>   | 680   | 100   | 6    | 6                              | –               | 516   | 603,9          |
| <b>NUP1092-M1</b>  | –                 | 1           | 131             | –                         | <b>460</b>   | 680   | 100   | 6    | 6                              | –               | 516   | 603,9          |
| <b>Z-539186.ZL</b> | –                 | 2 NUP       | 46,8            | –                         | <b>469,9</b> | 571,5 | 82,55 | 4    | 4                              | –               | 494,5 | 536            |

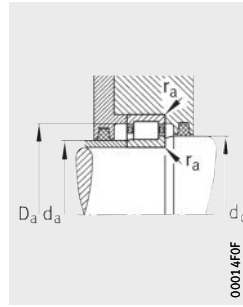
1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



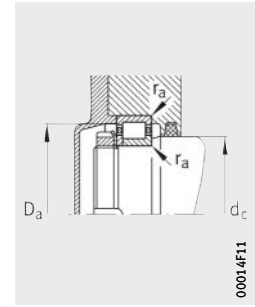
Design 2  
NUP  
Locating bearing



2) Axial displacement "s" for NJ

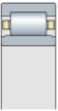


Mounting dimensions for NJ and HJ, page 367



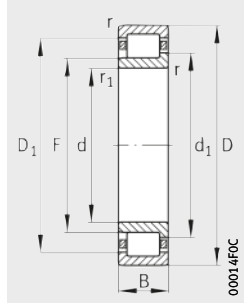
Mounting dimensions for NUP

|                |                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 493,3          | 24             | 39             | -              | 455                 | 476  | 500            | 585                | 3              | 3               | 1 630               | 3 450                 | 320                | 1 800             | 670               |
| 493,3          | -              | -              | 15             | 455                 | 476  | 500            | 585                | 3              | 3               | 1 630               | 3 450                 | 320                | 1 800             | 670               |
| 513,5          | -              | -              | -              | 463                 | 488  | 518            | 627                | 5              | 5               | 1 560               | 2 750                 | 244                | 1 600             | 850               |
| 513,5          | 24             | 45             | -              | 463                 | 488  | 518            | 627                | 5              | 5               | 1 560               | 2 750                 | 244                | 1 600             | 850               |
| 513,5          | -              | -              | -              | 463                 | 488  | 518            | 627                | 5              | 5               | 1 560               | 2 750                 | 244                | 1 600             | 850               |
| 513,5          | 24             | 45             | -              | 463                 | 488  | 518            | 627                | 5              | 5               | 1 560               | 2 750                 | 244                | 1 600             | 850               |
| 503,5          | -              | -              | -              | 472                 | 490  | 508            | 568                | 2,5            | 2,5             | 670                 | 1 430                 | 125                | 2 000             | -                 |
| 503,5          | 18             | 32             | -              | 472                 | 490  | 508            | 568                | 2,5            | 2,5             | 670                 | 1 430                 | 125                | 2 000             | -                 |
| 503,5          | -              | -              | -              | 472                 | 490  | 508            | 568                | 2,5            | 2,5             | 670                 | 1 430                 | 125                | 2 000             | -                 |
| 503,5          | 18             | 32             | -              | 472                 | 490  | 508            | 568                | 2,5            | 2,5             | 670                 | 1 430                 | 125                | 2 000             | -                 |
| 503,5          | -              | -              | -              | 472                 | 490  | 508            | 568                | 2,5            | 2,5             | 980                 | 2 360                 | 213                | 1 800             | 700               |
| 503,5          | -              | -              | -              | 472                 | 490  | 508            | 568                | 2,5            | 2,5             | 980                 | 2 360                 | 213                | 1 800             | 700               |
| 503,5          | -              | -              | 14             | 472                 | 490  | 508            | 568                | 2,5            | 2,5             | 980                 | 2 360                 | 213                | 1 800             | 700               |
| 503,5          | -              | -              | 14             | 472                 | 490  | 508            | 568                | 2,5            | 2,5             | 980                 | 2 360                 | 213                | 1 800             | 700               |
| 514,5          | -              | -              | -              | 475                 | 498  | 520            | 605                | 3              | 3               | 1 020               | 1 960                 | 173                | 1 800             | -                 |
| 514,5          | 24             | 42             | -              | 475                 | 498  | 520            | 605                | 3              | 3               | 1 020               | 1 960                 | 173                | 1 800             | -                 |
| 514,5          | -              | -              | -              | 475                 | 498  | 520            | 605                | 3              | 3               | 1 020               | 1 960                 | 173                | 1 800             | -                 |
| 514,5          | 24             | 42             | -              | 475                 | 498  | 520            | 605                | 3              | 3               | 1 020               | 1 960                 | 173                | 1 800             | -                 |
| 514,5          | -              | -              | 18             | 475                 | 498  | 520            | 605                | 3              | 3               | 1 020               | 1 960                 | 173                | 1 800             | -                 |
| 513,3          | -              | -              | -              | 475                 | 496  | 520            | 605                | 3              | 3               | 1 660               | 3 600                 | 325                | 1 600             | 630               |
| 513,3          | 24             | 39             | -              | 475                 | 496  | 520            | 605                | 3              | 3               | 1 660               | 3 600                 | 325                | 1 600             | 630               |
| 513,3          | -              | -              | 15             | 475                 | 496  | 520            | 605                | 3              | 3               | 1 660               | 3 600                 | 325                | 1 600             | 630               |
| 536,4          | -              | -              | -              | 483                 | 510  | 541            | 657                | 5              | 5               | 1 660               | 3 000                 | 260                | 1 600             | 800               |
| 536,4          | 25             | 48             | -              | 483                 | 510  | 541            | 657                | 5              | 5               | 1 660               | 3 000                 | 260                | 1 600             | 800               |
| 536,4          | -              | -              | -              | 483                 | 510  | 541            | 657                | 5              | 5               | 1 660               | 3 000                 | 260                | 1 600             | 800               |
| 536,4          | 25             | 48             | -              | 483                 | 510  | 541            | 657                | 5              | 5               | 1 660               | 3 000                 | 260                | 1 600             | 800               |
| 536,4          | -              | -              | 23             | 483                 | 510  | 541            | 657                | 5              | 5               | 1 660               | 3 000                 | 260                | 1 600             | 800               |
| 505            | -              | -              | 10,3           | -                   | -    | -              | -                  | 3              | 3               | 1 250               | 3 350                 | 275                | 1 900             | 560               |

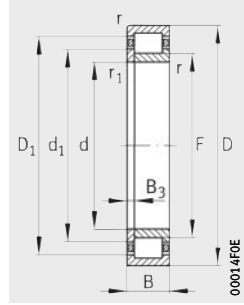


# Cylindrical roller bearings with cage

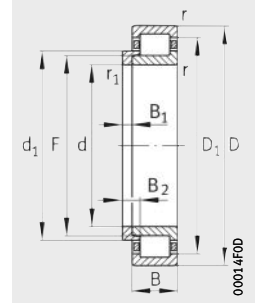
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing



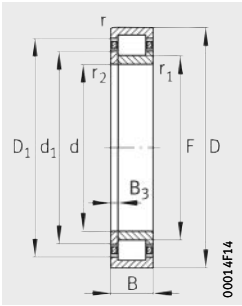
Design 1  
NJ and HJ  
Locating bearing

**Dimension table (continued)** · Dimensions in mm

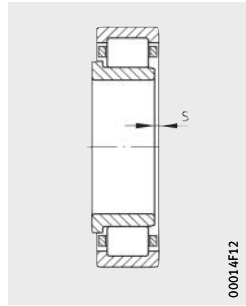
| Designation   |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |       |        |      |                                |                 |       |                |
|---------------|-------------------|-------------|----------------|--------------------------|------------|-------|--------|------|--------------------------------|-----------------|-------|----------------|
| Bearing       | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D     | B      | r    | r <sub>1</sub> /r <sub>2</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> |
|               |                   |             |                |                          |            |       |        | min. | min.                           |                 |       | ≈              |
| NJ1896-M1     | –                 | 1           | 36             | –                        | 480        | 600   | 56     | 3    | 3                              | 6,6             | 514   | 560,5          |
| NJ1896-M1     | HJ1896            | 1           | 36             | 5,43                     | 480        | 600   | 56     | 3    | 3                              | –               | 514   | 560,5          |
| NJ1896-M1A    | –                 | 1           | 36             | –                        | 480        | 600   | 56     | 3    | 3                              | 6,6             | 514   | 560,5          |
| NJ1896-M1A    | HJ1896            | 1           | 36             | 5,43                     | 480        | 600   | 56     | 3    | 3                              | –               | 514   | 560,5          |
| NJ2896-M1     | –                 | 1           | 47,2           | –                        | 480        | 600   | 72     | 3    | 3                              | 7,9             | 514   | 560,5          |
| NJ2896-M1     | HJ2896            | 1           | 47,2           | 5,55                     | 480        | 600   | 72     | 3    | 3                              | –               | 514   | 560,5          |
| NUP2896-M1    | –                 | 1           | 48,1           | –                        | 480        | 600   | 72     | 3    | 3                              | –               | 514   | 560,5          |
| NJ1996-M1     | –                 | 1           | 76             | –                        | 480        | 650   | 78     | 5    | 5                              | 6,8             | 525   | 589            |
| NJ1996-M1     | HJ1996            | 1           | 76             | 9,96                     | 480        | 650   | 78     | 5    | 5                              | –               | 525   | 589            |
| NJ2996-M1     | –                 | 1           | 98,8           | –                        | 480        | 650   | 100    | 5    | 5                              | 6,3             | 523   | 593            |
| NJ2996-M1A    | –                 | 1           | 98,8           | –                        | 480        | 650   | 100    | 5    | 5                              | 6,3             | 523   | 593            |
| NJ1096-M1     | –                 | 1           | 132            | –                        | 480        | 700   | 100    | 6    | 6                              | 10,7            | 536   | 623,9          |
| NJ1096-M1     | HJ1096            | 1           | 132            | 14,8                     | 480        | 700   | 100    | 6    | 6                              | –               | 536   | 623,9          |
| NJ1096-M1A    | –                 | 1           | 132            | –                        | 480        | 700   | 100    | 6    | 6                              | 10,7            | 536   | 623,9          |
| NJ1096-M1A    | HJ1096            | 1           | 132            | 14,8                     | 480        | 700   | 100    | 6    | 6                              | –               | 536   | 623,9          |
| NJ18/500-M1   | –                 | 1           | 37,8           | –                        | 500        | 620   | 56     | 3    | 3                              | 6,6             | 534   | 580            |
| NJ18/500-M1   | HJ18/500          | 1           | 37,8           | 5,78                     | 500        | 620   | 56     | 3    | 3                              | –               | 534   | 580            |
| NJ18/500-M1A  | –                 | 1           | 37,8           | –                        | 500        | 620   | 56     | 3    | 3                              | 6,6             | 534   | 580            |
| NJ18/500-M1A  | HJ18/500          | 1           | 37,8           | 5,78                     | 500        | 620   | 56     | 3    | 3                              | –               | 534   | 580            |
| NJ28/500-M1   | –                 | 1           | 49,3           | –                        | 500        | 620   | 72     | 3    | 3                              | 8               | 534   | 580            |
| NUP28/500-M1  | –                 | 1           | 50,3           | –                        | 500        | 620   | 72     | 3    | 3                              | –               | 534   | 580            |
| NJ19/500-M1   | –                 | 1           | 78,4           | –                        | 500        | 670   | 78     | 5    | 5                              | 8,8             | 545   | 609            |
| NJ19/500-M1   | HJ19/500          | 1           | 78,4           | 10,5                     | 500        | 670   | 78     | 5    | 5                              | –               | 545   | 609            |
| NUP19/500-M1  | –                 | 1           | 80,2           | –                        | 500        | 670   | 78     | 5    | 5                              | –               | 545   | 609            |
| NUP19/500-M1A | –                 | 1           | 80,2           | –                        | 500        | 670   | 78     | 5    | 5                              | –               | 545   | 609            |
| NJ10/500-M1   | –                 | 1           | 137            | –                        | 500        | 720   | 100    | 6    | 6                              | 10,7            | 556   | 643,9          |
| NJ10/500-M1   | HJ10/500          | 1           | 137            | 15,6                     | 500        | 720   | 100    | 6    | 6                              | –               | 556   | 643,9          |
| NJ10/500-M1A  | –                 | 1           | 137            | –                        | 500        | 720   | 100    | 6    | 6                              | 10,7            | 556   | 643,9          |
| NJ10/500-M1A  | HJ10/500          | 1           | 137            | 15,6                     | 500        | 720   | 100    | 6    | 6                              | –               | 556   | 643,9          |
| Z-539187.ZL   | –                 | 2 NUP       | 48,2           | –                        | 508        | 609,6 | 82,55  | 4    | 4                              | –               | 529   | 579            |
| Z-544258.ZL   | –                 | 2 NUP       | 48,6           | –                        | 508        | 609,6 | 82,55  | 5,1  | 5,1                            | –               | 528,8 | 579            |
| Z-544514.ZL   | –                 | 2 NUP       | 53,7           | –                        | 508        | 622,3 | 79,575 | 6    | 6/4                            | –               | 532   | 588,7          |
| Z-544760.ZL   | –                 | 2 NUP       | 59,7           | –                        | 508        | 635   | 76,2   | 4    | 7,5/4                          | –               | 544,9 | 587,6          |
| Z-544002.ZL   | –                 | 2 NUP       | 63,7           | –                        | 508,1      | 622,3 | 95,25  | 6    | 6                              | –               | 529   | 589            |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

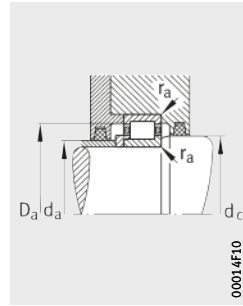




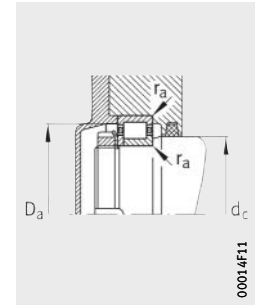
Design 2  
NUP  
Locating bearing



2) Axial displacement "s" for NJ

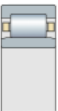


Mounting dimensions  
for NJ and HJ  
for NJ, page 369



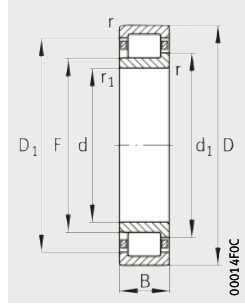
Mounting dimensions  
for NUP

|                |                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 523,5          | -              | -              | -              | 492                 | 510  | 528            | 588                | 2,5            | 2,5             | 680                 | 1 460                 | 126                | 1 900             | -                 |
| 523,5          | 18             | 32             | -              | 492                 | 510  | 528            | 588                | 2,5            | 2,5             | 680                 | 1 460                 | 126                | 1 900             | -                 |
| 523,5          | -              | -              | -              | 492                 | 510  | 528            | 588                | 2,5            | 2,5             | 680                 | 1 460                 | 126                | 1 900             | -                 |
| 523,5          | 18             | 32             | -              | 492                 | 510  | 528            | 588                | 2,5            | 2,5             | 680                 | 1 460                 | 126                | 1 900             | -                 |
| 523,5          | -              | -              | -              | 492                 | 510  | 528            | 588                | 2,5            | 2,5             | 1 000               | 2 400                 | 215                | 1 800             | 670               |
| 523,5          | 18             | 32             | -              | 492                 | 510  | 528            | 588                | 2,5            | 2,5             | 1 000               | 2 400                 | 215                | 1 800             | 670               |
| 523,5          | -              | -              | 14             | 492                 | 510  | 528            | 588                | 2,5            | 2,5             | 1 000               | 2 400                 | 216                | 1 800             | 670               |
| 540            | -              | -              | -              | 497                 | 521  | 545            | 633                | 4              | 4               | 1 140               | 2 240                 | 196                | 1 800             | -                 |
| 540            | 24             | 43             | -              | 497                 | 521  | 545            | 633                | 4              | 4               | 1 140               | 2 240                 | 196                | 1 800             | -                 |
| 539            | -              | -              | -              | 497                 | 519  | 544            | 633                | 4              | 4               | 1 900               | 4 150                 | 380                | 1 500             | 560               |
| 539            | -              | -              | -              | 497                 | 519  | 544            | 633                | 4              | 4               | 1 900               | 4 150                 | 380                | 1 500             | 560               |
| 556,4          | -              | -              | -              | 503                 | 530  | 562            | 677                | 5              | 5               | 1 700               | 3 100                 | 270                | 1 500             | 800               |
| 556,4          | 25             | 48             | -              | 503                 | 530  | 562            | 677                | 5              | 5               | 1 700               | 3 100                 | 270                | 1 500             | 800               |
| 556,4          | -              | -              | -              | 503                 | 530  | 562            | 677                | 5              | 5               | 1 700               | 3 100                 | 270                | 1 500             | 800               |
| 556,4          | 25             | 48             | -              | 503                 | 530  | 562            | 677                | 5              | 5               | 1 700               | 3 100                 | 270                | 1 500             | 800               |
| 543,5          | -              | -              | -              | 512                 | 530  | 549            | 608                | 2,5            | 2,5             | 695                 | 1 530                 | 130                | 1 800             | -                 |
| 543,5          | 18             | 32             | -              | 512                 | 530  | 549            | 608                | 2,5            | 2,5             | 695                 | 1 530                 | 130                | 1 800             | -                 |
| 543,5          | -              | -              | -              | 512                 | 530  | 549            | 608                | 2,5            | 2,5             | 695                 | 1 530                 | 130                | 1 800             | -                 |
| 543,5          | 18             | 32             | -              | 512                 | 530  | 549            | 608                | 2,5            | 2,5             | 695                 | 1 530                 | 130                | 1 800             | -                 |
| 543,5          | -              | -              | -              | 512                 | 530  | 549            | 608                | 2,5            | 2,5             | 1 020               | 2 500                 | 222                | 1 600             | 630               |
| 543,5          | -              | -              | 14             | 512                 | 530  | 549            | 608                | 2,5            | 2,5             | 1 020               | 2 500                 | 222                | 1 600             | 630               |
| 558,2          | -              | -              | -              | 517                 | 541  | 565            | 653                | 4              | 4               | 1 160               | 2 320                 | 200                | 1 600             | -                 |
| 558,2          | 24             | 43             | -              | 517                 | 541  | 565            | 653                | 4              | 4               | 1 160               | 2 320                 | 200                | 1 600             | -                 |
| 558,2          | -              | -              | 19             | 517                 | 541  | 565            | 653                | 4              | 4               | 1 160               | 2 320                 | 200                | 1 600             | -                 |
| 558,2          | -              | -              | 19             | 517                 | 541  | 565            | 653                | 4              | 4               | 1 160               | 2 320                 | 200                | 1 600             | -                 |
| 576,4          | -              | -              | -              | 523                 | 550  | 582            | 697                | 5              | 5               | 1 760               | 3 200                 | 275                | 1 500             | 750               |
| 576,4          | 25             | 48             | -              | 523                 | 550  | 582            | 697                | 5              | 5               | 1 760               | 3 200                 | 275                | 1 500             | 750               |
| 576,4          | -              | -              | -              | 523                 | 550  | 582            | 697                | 5              | 5               | 1 760               | 3 200                 | 275                | 1 500             | 750               |
| 576,4          | 25             | 48             | -              | 523                 | 550  | 582            | 697                | 5              | 5               | 1 760               | 3 200                 | 275                | 1 500             | 750               |
| 540,5          | -              | -              | 11,3           | -                   | -    | -              | -                  | 3              | 3               | 1 290               | 3 250                 | 255                | 1 000             | -                 |
| 540,8          | -              | -              | 11,3           | -                   | -    | -              | -                  | 4              | 4               | 1 340               | 3 450                 | 270                | 1 600             | 530               |
| 545,1          | -              | -              | 12,2           | -                   | -    | -              | -                  | 5              | 5/3             | 1 370               | 3 150                 | 250                | 1 600             | 530               |
| 555            | -              | -              | 12,1           | -                   | -    | -              | -                  | 3              | 6/3             | 1 140               | 3 050                 | 244                | 1 600             | 530               |
| 542,8          | -              | -              | 11,6           | -                   | -    | -              | -                  | 5              | 5               | 1 760               | 4 250                 | 275                | 1 600             | -                 |

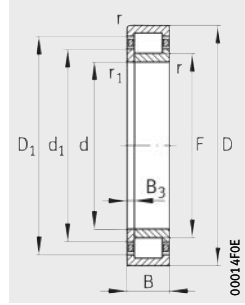


# Cylindrical roller bearings with cage

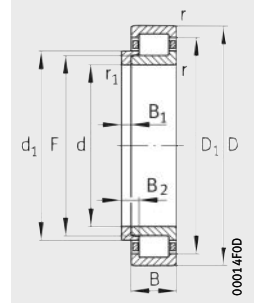
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

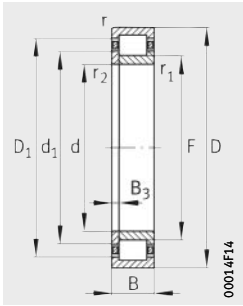


Design 1  
NJ and HJ  
Locating bearing

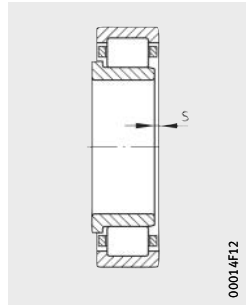
Dimension table (continued) · Dimensions in mm

| Designation   |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |       |         |      |                                |                 |       |                |
|---------------|-------------------|-------------|----------------|--------------------------|------------|-------|---------|------|--------------------------------|-----------------|-------|----------------|
| Bearing       | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D     | B       | r    | r <sub>1</sub> /r <sub>2</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> |
|               |                   |             |                |                          |            |       |         | min. | min.                           |                 |       | ≈              |
| NJ18/530-M1   | –                 | 1           | 39,3           | –                        | 530        | 650   | 56      | 3    | 3                              | 8,5             | 564   | 610,5          |
| NJ18/530-M1   | HJ18/530          | 1           | 39,3           | 6,11                     | 530        | 650   | 56      | 3    | 3                              | –               | 564   | 610,5          |
| NJ18/530-M1A  | –                 | 1           | 39,3           | –                        | 530        | 650   | 56      | 3    | 3                              | 8,5             | 564   | 610,5          |
| NJ18/530-M1A  | HJ18/530          | 1           | 39,3           | 6,11                     | 530        | 650   | 56      | 3    | 3                              | –               | 564   | 610,5          |
| NJ28/530-M1   | –                 | 1           | 51,6           | –                        | 530        | 650   | 72      | 3    | 3                              | 8               | 564   | 610,5          |
| NJ28/530-M1A  | –                 | 1           | 51,6           | –                        | 530        | 650   | 72      | 3    | 3                              | 8               | 564   | 610,5          |
| NUP28/530-M1  | –                 | 1           | 52,6           | –                        | 530        | 650   | 72      | 3    | 3                              | –               | 564   | 610,5          |
| NUP28/530-M1A | –                 | 1           | 52,6           | –                        | 530        | 650   | 72      | 3    | 3                              | –               | 564   | 610,5          |
| NJ19/530-M1   | –                 | 1           | 91,9           | –                        | 530        | 710   | 82      | 5    | 5                              | 9,3             | 578   | 645,2          |
| NJ19/530-M1   | HJ19/530          | 1           | 91,9           | 12,4                     | 530        | 710   | 82      | 5    | 5                              | –               | 578   | 645,2          |
| NJ10/530-M1   | –                 | 1           | 193            | –                        | 530        | 780   | 112     | 6    | 6                              | 10,2            | 591   | 696            |
| NJ10/530-M1   | HJ10/530          | 1           | 193            | 19,1                     | 530        | 780   | 112     | 6    | 6                              | –               | 591   | 696            |
| NJ10/530-M1A  | –                 | 1           | 193            | –                        | 530        | 780   | 112     | 6    | 6                              | 10,2            | 591   | 696            |
| NJ10/530-M1A  | HJ10/530          | 1           | 193            | 19,1                     | 530        | 780   | 112     | 6    | 6                              | –               | 591   | 696            |
| Z-544001.ZL   | –                 | 2 NUP       | 101            | –                        | 533,4      | 685,8 | 101,6   | 3    | 6/3                            | –               | 570   | 636,5          |
| Z-544515.ZL   | –                 | 2 NUP       | 66,5           | –                        | 546,1      | 660,4 | 92,08   | 5    | 5                              | –               | 571   | 627,6          |
| Z-544759.ZL   | –                 | 2 NUP       | 81,4           | –                        | 558,8      | 685,8 | 100,013 | 5,5  | 5,5                            | –               | 584,3 | 648            |
| Z-545998.ZL   | –                 | 2 NUP       | 114            | –                        | 558,8      | 711,2 | 111,125 | 3    | 6/3                            | –               | 595   | 661,8          |
| NJ18/560-M1   | –                 | 1           | 41,5           | –                        | 560        | 680   | 56      | 3    | 3                              | 6,6             | 594   | 640            |
| NJ18/560-M1   | HJ18/560          | 1           | 41,5           | 6,44                     | 560        | 680   | 56      | 3    | 3                              | –               | 594   | 640            |
| NJ18/560-M1A  | –                 | 1           | 41,5           | –                        | 560        | 680   | 56      | 3    | 3                              | 6,6             | 594   | 640            |
| NJ18/560-M1A  | HJ18/560          | 1           | 41,5           | 6,44                     | 560        | 680   | 56      | 3    | 3                              | –               | 594   | 640            |
| NJ28/560-M1A  | –                 | 1           | 54,4           | –                        | 560        | 680   | 72      | 3    | 3                              | 8               | 594   | 640            |
| NUP28/560-M1  | –                 | 1           | 55,5           | –                        | 560        | 680   | 72      | 3    | 3                              | –               | 594   | 640            |
| NJ19/560-M1   | –                 | 1           | 107            | –                        | 560        | 750   | 85      | 5    | 5                              | 9,6             | 610   | 682            |
| NJ19/560-M1   | HJ19/560          | 1           | 107            | 14,3                     | 560        | 750   | 85      | 5    | 5                              | –               | 610   | 682            |
| NJ19/560-M1A  | –                 | 1           | 107            | –                        | 560        | 750   | 85      | 5    | 5                              | 9,6             | 610   | 682            |
| NJ19/560-M1A  | HJ19/560          | 1           | 107            | 14,3                     | 560        | 750   | 85      | 5    | 5                              | –               | 610   | 682            |
| NJ29/560-M1   | –                 | 1           | 143            | –                        | 560        | 750   | 112     | 5    | 5                              | 6,5             | 607   | 687,5          |
| NJ10/560-M1   | –                 | 1           | 216            | –                        | 560        | 820   | 115     | 6    | 6                              | 9,8             | 626   | 731            |
| NJ10/560-M1   | HJ10/560          | 1           | 216            | 23,5                     | 560        | 820   | 115     | 6    | 6                              | –               | 626   | 731            |
| NJ10/560-M1A  | –                 | 1           | 216            | –                        | 560        | 820   | 115     | 6    | 6                              | 9,8             | 626   | 731            |
| NJ10/560-M1A  | HJ10/560          | 1           | 216            | 23,5                     | 560        | 820   | 115     | 6    | 6                              | –               | 626   | 731            |
| Z-544513.ZL   | –                 | 2 NUP       | 108            | –                        | 569,9      | 723,9 | 101,6   | 6    | 6                              | –               | 622   | 685,5          |

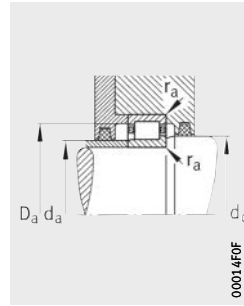
1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



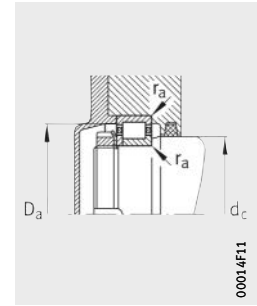
Design 2  
NUP  
Locating bearing



2) Axial displacement "s" for NJ



Mounting dimensions  
for NJ  
for NJ and HJ, page 371



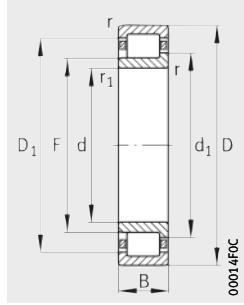
Mounting dimensions  
for NUP

|                |                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 573,5          | -              | -              | -              | 542                 | 560  | 579            | 638                | 2,5            | 2,5             | 720                 | 1 660                 | 138                | 1 800             | -                 |
| 573,5          | 18             | 32             | -              | 542                 | 560  | 579            | 638                | 2,5            | 2,5             | 720                 | 1 660                 | 138                | 1 800             | -                 |
| 573,5          | -              | -              | -              | 542                 | 560  | 579            | 638                | 2,5            | 2,5             | 720                 | 1 660                 | 138                | 1 800             | -                 |
| 573,5          | 18             | 32             | -              | 542                 | 560  | 579            | 638                | 2,5            | 2,5             | 720                 | 1 660                 | 138                | 1 800             | -                 |
| 573,5          | -              | -              | -              | 542                 | 560  | 579            | 638                | 2,5            | 2,5             | 1 060               | 2 700                 | 237                | 1 500             | 600               |
| 573,5          | -              | -              | -              | 542                 | 560  | 579            | 638                | 2,5            | 2,5             | 1 060               | 2 700                 | 237                | 1 500             | 600               |
| 573,5          | -              | -              | 14             | 542                 | 560  | 579            | 638                | 2,5            | 2,5             | 1 060               | 2 700                 | 236                | 1 500             | 600               |
| 573,5          | -              | -              | 14             | 542                 | 560  | 579            | 638                | 2,5            | 2,5             | 1 060               | 2 700                 | 236                | 1 500             | 600               |
| 592            | -              | -              | -              | 547                 | 574  | 599            | 693                | 4              | 4               | 1 290               | 2 650                 | 224                | 1 500             | -                 |
| 592            | 25             | 45             | -              | 547                 | 574  | 599            | 693                | 4              | 4               | 1 290               | 2 650                 | 224                | 1 500             | -                 |
| 615            | -              | -              | -              | 553                 | 585  | 621            | 757                | 5              | 5               | 2 500               | 4 550                 | 390                | 1 300             | 630               |
| 615            | 26             | 48             | -              | 553                 | 585  | 621            | 757                | 5              | 5               | 2 500               | 4 550                 | 390                | 1 300             | 630               |
| 615            | -              | -              | -              | 553                 | 585  | 621            | 757                | 5              | 5               | 2 500               | 4 550                 | 390                | 1 300             | 630               |
| 615            | 26             | 48             | -              | 553                 | 585  | 621            | 757                | 5              | 5               | 2 500               | 4 550                 | 390                | 1 300             | 630               |
| 585,4          | -              | -              | 13,3           | -                   | -    | -              | -                  | 2,5            | 5/2,5           | 2 040               | 4 800                 | 375                | 1 400             | 450               |
| 584,5          | -              | -              | 12             | -                   | -    | -              | -                  | 4              | 4               | 1 700               | 4 400                 | 345                | 1 500             | 450               |
| 599            | -              | -              | 14             | -                   | -    | -              | -                  | 4              | 4               | 1 930               | 4 750                 | 415                | 1 400             | -                 |
| 610,3          | -              | -              | 15,6           | -                   | -    | -              | -                  | 2,5            | 5/2,5           | 2 200               | 5 400                 | 415                | 1 400             | 430               |
| 603,5          | -              | -              | -              | 572                 | 590  | 609            | 668                | 2,5            | 2,5             | 735                 | 1 700                 | 139                | 1 600             | -                 |
| 603,5          | 18             | 32             | -              | 572                 | 590  | 609            | 668                | 2,5            | 2,5             | 735                 | 1 700                 | 139                | 1 600             | -                 |
| 603,5          | -              | -              | -              | 572                 | 590  | 609            | 668                | 2,5            | 2,5             | 735                 | 1 700                 | 139                | 1 600             | -                 |
| 603,5          | 18             | 32             | -              | 572                 | 590  | 609            | 668                | 2,5            | 2,5             | 735                 | 1 700                 | 139                | 1 600             | -                 |
| 603,5          | -              | -              | -              | 572                 | 590  | 609            | 668                | 2,5            | 2,5             | 1 060               | 2 750                 | 238                | 1 500             | 560               |
| 603,5          | -              | -              | 14             | 572                 | 590  | 609            | 668                | 2,5            | 2,5             | 1 060               | 2 750                 | 238                | 1 500             | 560               |
| 625            | -              | -              | -              | 577                 | 606  | 632            | 733                | 4              | 4               | 1 460               | 3 000                 | 244                | 1 400             | -                 |
| 625            | 26             | 46             | -              | 577                 | 606  | 632            | 733                | 4              | 4               | 1 460               | 3 000                 | 244                | 1 400             | -                 |
| 625            | -              | -              | -              | 577                 | 606  | 632            | 733                | 4              | 4               | 1 460               | 3 000                 | 244                | 1 400             | -                 |
| 625            | 26             | 46             | -              | 577                 | 606  | 632            | 733                | 4              | 4               | 1 460               | 3 000                 | 244                | 1 400             | -                 |
| 625            | -              | -              | -              | 577                 | 603  | 630            | 733                | 4              | 4               | 2 450               | 5 500                 | 475                | 1 400             | 450               |
| 650            | -              | -              | -              | 583                 | 620  | 657            | 797                | 5              | 5               | 2 700               | 5 100                 | 435                | 1 200             | 600               |
| 650            | 30             | 50             | -              | 583                 | 620  | 657            | 797                | 5              | 5               | 2 700               | 5 100                 | 435                | 1 200             | 600               |
| 650            | -              | -              | -              | 583                 | 620  | 657            | 797                | 5              | 5               | 2 700               | 5 100                 | 435                | 1 200             | 600               |
| 650            | 30             | 50             | -              | 583                 | 620  | 657            | 797                | 5              | 5               | 2 700               | 5 100                 | 435                | 1 200             | 600               |
| 636,7          | -              | -              | 14,8           | -                   | -    | -              | -                  | 5              | 5               | 2 000               | 5 100                 | 385                | 1 400             | 400               |

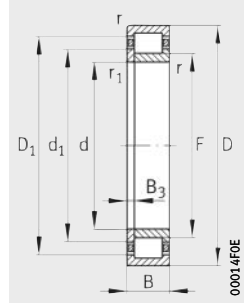


# Cylindrical roller bearings with cage

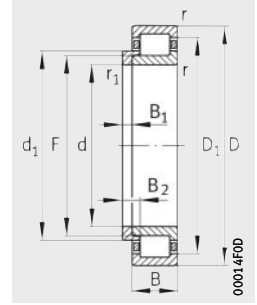
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

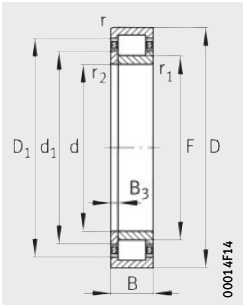


Design 1  
NJ and HJ  
Locating bearing

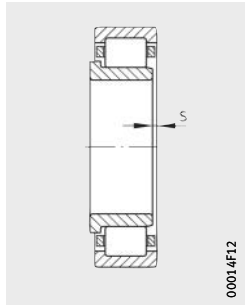
**Dimension table (continued)** · Dimensions in mm

| Designation    |                   | De-<br>sign | Mass           |                          | Dimensions     |       |        |      |                                |                 |       |                |
|----------------|-------------------|-------------|----------------|--------------------------|----------------|-------|--------|------|--------------------------------|-----------------|-------|----------------|
| Bearing        | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d              | D     | B      | r    | r <sub>1</sub> /r <sub>2</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> |
|                |                   |             |                |                          |                |       | min.   | min. |                                |                 |       | ≈              |
| Z-548036.ZL    | –                 | 2 NUP       | 97,3           | –                        | <b>570</b>     | 720   | 95     | 3    | 3                              | –               | 608   | 671,5          |
| Z-544257.ZL    | –                 | 2 NUP       | 75             | –                        | <b>571,5</b>   | 685,1 | 101,6  | 6    | 6                              | –               | 594,5 | 651            |
| Z-547424.ZL    | –                 | 2 NUP       | 115            | –                        | <b>571,5</b>   | 711,2 | 120,65 | 5    | 5                              | –               | 601,5 | 668,3          |
| Z-544427.ZL    | –                 | 2 NUP       | 107            | –                        | <b>571,5</b>   | 723,9 | 101,6  | 6    | 6                              | –               | 609,5 | 675,9          |
| Z-543431.ZL    | –                 | 2 NUP       | 91,1           | –                        | <b>588,724</b> | 711,2 | 88,9   | 6    | 6                              | –               | 589   | 669            |
| Z-545612.ZL    | –                 | 2 NUP       | 98,4           | –                        | <b>596,9</b>   | 736,6 | 101,6  | 6    | 6                              | –               | 624,5 | 694,5          |
| NJ18/600-M1    | –                 | 1           | 51,7           | –                        | <b>600</b>     | 730   | 60     | 3    | 3                              | 7               | 637   | 687            |
| NJ18/600-M1    | HJ18/600          | 1           | 51,7           | 8,22                     | <b>600</b>     | 730   | 60     | 3    | 3                              | –               | 637   | 687            |
| NJ18/600-M1A   | –                 | 1           | 51,7           | –                        | <b>600</b>     | 730   | 60     | 3    | 3                              | 7               | 637   | 687            |
| NJ18/600-M1A   | HJ18/600          | 1           | 51,7           | 8,22                     | <b>600</b>     | 730   | 60     | 3    | 3                              | –               | 637   | 687            |
| NJ28/600-M1    | –                 | 1           | 63,4           | –                        | <b>600</b>     | 730   | 78     | 3    | 3                              | 8,5             | 637   | 687            |
| NUP28/600-M1   | –                 | 1           | 69,8           | –                        | <b>600</b>     | 730   | 78     | 3    | 3                              | –               | 637   | 687            |
| NJ19/600-M1    | –                 | 1           | 128            | –                        | <b>600</b>     | 800   | 90     | 5    | 5                              | 9,9             | 652   | 730,7          |
| NJ19/600-M1    | HJ19/600          | 1           | 128            | 15,9                     | <b>600</b>     | 800   | 90     | 5    | 5                              | –               | 652   | 730,7          |
| NJ19/600-M1A   | –                 | 1           | 128            | –                        | <b>600</b>     | 800   | 90     | 5    | 5                              | 9,9             | 652   | 730,7          |
| NJ19/600-M1A   | HJ19/600          | 1           | 128            | 15,9                     | <b>600</b>     | 800   | 90     | 5    | 5                              | –               | 652   | 730,7          |
| NJ29/600-E-M1  | –                 | 1           | 174            | –                        | <b>600</b>     | 800   | 118    | 5    | 5                              | 8,4             | 649   | 739            |
| NJ10/600-M1    | –                 | 1           | 246            | –                        | <b>600</b>     | 870   | 118    | 6    | 6                              | 10,6            | 667   | 776            |
| NJ10/600-M1    | HJ10/600          | 1           | 246            | 26,4                     | <b>600</b>     | 870   | 118    | 6    | 6                              | –               | 667   | 776            |
| NJ10/600-M1A   | –                 | 1           | 246            | –                        | <b>600</b>     | 870   | 118    | 6    | 6                              | 10,6            | 667   | 776            |
| NJ10/600-M1A   | HJ10/600          | 1           | 246            | 26,4                     | <b>600</b>     | 870   | 118    | 6    | 6                              | –               | 667   | 776            |
| NJ18/630-M1    | –                 | 1           | 73,4           | –                        | <b>630</b>     | 780   | 69     | 4    | 4                              | 8,4             | 672   | 732            |
| NJ18/630-M1    | HJ18/630          | 1           | 73,4           | 10,4                     | <b>630</b>     | 780   | 69     | 4    | 4                              | –               | 672   | 732            |
| NJ18/630-M1A   | –                 | 1           | 73,4           | –                        | <b>630</b>     | 780   | 69     | 4    | 4                              | 8,4             | 672   | 732            |
| NJ18/630-M1A   | HJ18/630          | 1           | 73,4           | 10,4                     | <b>630</b>     | 780   | 69     | 4    | 4                              | –               | 672   | 732            |
| NJ28/630-M1    | –                 | 1           | 96,2           | –                        | <b>630</b>     | 780   | 88     | 4    | 4                              | 8,7             | 672   | 732            |
| NJ28/630-M1A   | –                 | 1           | 96,2           | –                        | <b>630</b>     | 780   | 88     | 4    | 4                              | 8,7             | 672   | 732            |
| NUP28/630-M1   | –                 | 1           | 97,7           | –                        | <b>630</b>     | 780   | 88     | 4    | 4                              | –               | 672   | 732            |
| NUP28/630-M1A  | –                 | 1           | 97,7           | –                        | <b>630</b>     | 780   | 88     | 4    | 4                              | –               | 672   | 732            |
| NJ19/630-M1    | –                 | 1           | 166            | –                        | <b>630</b>     | 850   | 100    | 6    | 6                              | 8,5             | 688   | 771            |
| NJ19/630-M1    | HJ19/630          | 1           | 166            | 18,9                     | <b>630</b>     | 850   | 100    | 6    | 6                              | –               | 688   | 771            |
| NUP19/630-M1   | –                 | 1           | 172            | –                        | <b>630</b>     | 850   | 100    | 6    | 6                              | –               | 688   | 771            |
| NJ29/630-E-M1  | –                 | 1           | 213            | –                        | <b>630</b>     | 850   | 128    | 6    | 6                              | 10,3            | 683   | 784            |
| NJ29/630-E-M1A | –                 | 1           | 213            | –                        | <b>630</b>     | 850   | 128    | 6    | 6                              | 10,3            | 683   | 784            |
| NJ10/630-M1    | –                 | 1           | 294            | –                        | <b>630</b>     | 920   | 128    | 7,5  | 7,5                            | 11,7            | 700   | 826,2          |

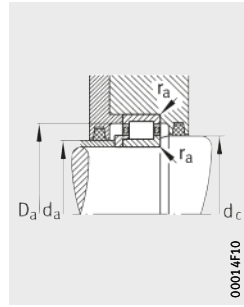
<sup>1)</sup> Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



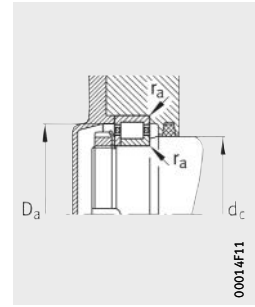
Design 2  
NUP  
Locating bearing



2) Axial displacement "s" for NJ

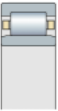


Mounting dimensions  
for NJ and HJ  
for NJ, page 373



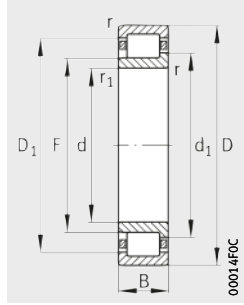
Mounting dimensions  
for NUP

|                |                |                |                | Mounting dimensions |                |                |                    |                 |                     | Basic load ratings    |                 | Fatigue limit load | Limiting speed    | Reference speed |
|----------------|----------------|----------------|----------------|---------------------|----------------|----------------|--------------------|-----------------|---------------------|-----------------------|-----------------|--------------------|-------------------|-----------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      | d <sub>c</sub> | D <sub>a</sub> | r <sub>a</sub>     | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub> | n <sub>G</sub>     | n <sub>B</sub>    |                 |
| ≈              |                |                |                | min. <sup>1)</sup>  | max.           | min.           | max. <sup>1)</sup> | max.            | kN                  | kN                    | kN              | min <sup>-1</sup>  | min <sup>-1</sup> |                 |
| 622,5          | -              | -              | 15             | -                   | -              | -              | -                  | 2               | 2                   | 1 800                 | 4 300           | 375                | 1 400             | -               |
| 608            | -              | -              | 13,3           | -                   | -              | -              | -                  | 5               | 5                   | 1 860                 | 4 900           | 385                | 1 400             | 430             |
| 616,9          | -              | -              | 12,8           | -                   | -              | -              | -                  | 4               | 4                   | 2 500                 | 6 400           | 570                | 1 400             | -               |
| 624,8          | -              | -              | 13,3           | -                   | -              | -              | -                  | 5               | 5                   | 2 120                 | 5 200           | 395                | 1 400             | 400             |
| 607            | -              | -              | 12             | -                   | -              | -              | -                  | 5               | 5                   | 2 080                 | 4 400           | 380                | 1 400             | 430             |
| 640,5          | -              | -              | 13,3           | -                   | -              | -              | -                  | 5               | 5                   | 2 200                 | 5 300           | 455                | 1 400             | -               |
| 647            | -              | -              | -              | 612                 | 632            | 654            | 718                | 2,5             | 2,5                 | 850                   | 2 000           | 161                | 1 500             | -               |
| 647            | 20             | 35             | -              | 612                 | 632            | 654            | 718                | 2,5             | 2,5                 | 850                   | 2 000           | 161                | 1 500             | -               |
| 647            | -              | -              | -              | 612                 | 632            | 654            | 718                | 2,5             | 2,5                 | 850                   | 2 000           | 161                | 1 500             | -               |
| 647            | 20             | 35             | -              | 612                 | 632            | 654            | 718                | 2,5             | 2,5                 | 850                   | 2 000           | 161                | 1 500             | -               |
| 647            | -              | -              | -              | 612                 | 632            | 654            | 718                | 2,5             | 2,5                 | 1 250                 | 3 350           | 280                | 1 400             | 500             |
| 647            | -              | -              | 15             | 612                 | 632            | 654            | 718                | 2,5             | 2,5                 | 1 250                 | 3 350           | 280                | 1 400             | 500             |
| 667,5          | -              | -              | -              | 617                 | 647            | 675            | 783                | 4               | 4                   | 1 700                 | 3 450           | 280                | 1 400             | -               |
| 667,5          | 26             | 47             | -              | 617                 | 647            | 675            | 783                | 4               | 4                   | 1 700                 | 3 450           | 280                | 1 400             | -               |
| 667,5          | -              | -              | -              | 617                 | 647            | 675            | 783                | 4               | 4                   | 1 700                 | 3 450           | 280                | 1 400             | -               |
| 667,5          | 26             | 47             | -              | 617                 | 647            | 675            | 783                | 4               | 4                   | 1 700                 | 3 450           | 280                | 1 400             | -               |
| 666            | -              | -              | -              | 617                 | 645            | 674            | 783                | 4               | 4                   | 3 000                 | 6 700           | 570                | 1 200             | 400             |
| 693,5          | -              | -              | -              | 623                 | 661            | 699            | 847                | 5               | 5                   | 2 850                 | 5 400           | 440                | 1 100             | 530             |
| 693,5          | 30             | 51,5           | -              | 623                 | 661            | 699            | 847                | 5               | 5                   | 2 850                 | 5 400           | 440                | 1 100             | 530             |
| 693,5          | -              | -              | -              | 623                 | 661            | 699            | 847                | 5               | 5                   | 2 850                 | 5 400           | 440                | 1 100             | 530             |
| 693,5          | 30             | 51,5           | -              | 623                 | 661            | 699            | 847                | 5               | 5                   | 2 850                 | 5 400           | 440                | 1 100             | 530             |
| 684            | -              | -              | -              | 645                 | 667            | 691            | 765                | 3               | 3                   | 1 140                 | 2 600           | 212                | 1 400             | -               |
| 684            | 20,5           | 37             | -              | 645                 | 667            | 691            | 765                | 3               | 3                   | 1 140                 | 2 600           | 212                | 1 400             | -               |
| 684            | -              | -              | -              | 645                 | 667            | 691            | 765                | 3               | 3                   | 1 140                 | 2 600           | 212                | 1 400             | -               |
| 684            | 20,5           | 37             | -              | 645                 | 667            | 691            | 765                | 3               | 3                   | 1 140                 | 2 600           | 212                | 1 400             | -               |
| 684            | -              | -              | -              | 645                 | 667            | 691            | 765                | 3               | 3                   | 1 700                 | 4 400           | 370                | 1 300             | 430             |
| 684            | -              | -              | -              | 645                 | 667            | 691            | 765                | 3               | 3                   | 1 700                 | 4 400           | 370                | 1 300             | 430             |
| 684            | -              | -              | 15             | 645                 | 667            | 691            | 765                | 3               | 3                   | 1 700                 | 4 400           | 370                | 1 300             | 430             |
| 684            | -              | -              | 15             | 645                 | 667            | 691            | 765                | 3               | 3                   | 1 700                 | 4 400           | 370                | 1 300             | 430             |
| 705            | -              | -              | -              | 653                 | 683            | 713            | 827                | 5               | 5                   | 1 900                 | 3 900           | 320                | 1 300             | -               |
| 705            | 26             | 50             | -              | 653                 | 683            | 713            | 827                | 5               | 5                   | 1 900                 | 3 900           | 320                | 1 300             | -               |
| 705            | -              | -              | 24             | 653                 | 683            | 713            | 827                | 5               | 5                   | 1 900                 | 3 900           | 320                | 1 300             | -               |
| 702,5          | -              | -              | -              | 653                 | 678            | 710,4          | 827                | 5               | 5                   | 3 350                 | 7 350           | 540                | 1 100             | 380             |
| 702,5          | -              | -              | -              | 653                 | 678            | 710,4          | 827                | 5               | 5                   | 3 350                 | 7 350           | 540                | 1 100             | 380             |
| 728            | -              | -              | -              | 658                 | 694            | 734            | 892                | 6               | 6                   | 3 250                 | 6 200           | 495                | 1 100             | 500             |

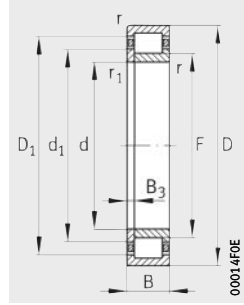


# Cylindrical roller bearings with cage

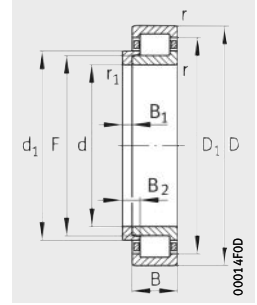
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

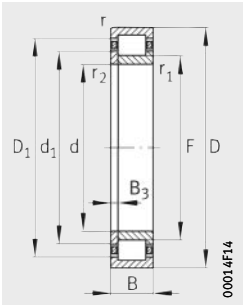


Design 1  
NJ and HJ  
Locating bearing

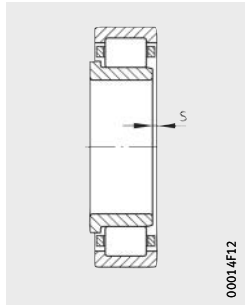
Dimension table (continued) · Dimensions in mm

| Designation   |                   | De-<br>sign | Mass<br>m       |                           | Dimensions |         |         |     |                                |                 |       |                     |
|---------------|-------------------|-------------|-----------------|---------------------------|------------|---------|---------|-----|--------------------------------|-----------------|-------|---------------------|
| Bearing       | L-section<br>ring |             | Bearing<br>≈ kg | L-section<br>ring<br>≈ kg | d          | D       | B       | r   | r <sub>1</sub> /r <sub>2</sub> | s <sup>2)</sup> | F     | D <sub>1</sub><br>≈ |
| NJ10/630-M1   | HJ10/630          | 1           | 294             | 30,7                      | 630        | 920     | 128     | 7,5 | 7,5                            | –               | 700   | 826,2               |
| NJ10/630-M1A  | –                 | 1           | 294             | –                         | 630        | 920     | 128     | 7,5 | 7,5                            | 11,7            | 700   | 826,2               |
| NJ10/630-M1A  | HJ10/630          | 1           | 294             | 30,7                      | 630        | 920     | 128     | 7,5 | 7,5                            | –               | 700   | 826,2               |
| Z-546151.ZL   | –                 | 2 NUP       | 142             | –                         | 647,7      | 825,5   | 101,6   | 6   | 6                              | –               | 686,6 | 770,2               |
| Z-544979.ZL   | –                 | 2 NUP       | 130             | –                         | 660,4      | 812,8   | 107,95  | 6   | 6                              | –               | 698,5 | 765,3               |
| Z-544000.ZL   | –                 | 2 NUP       | 180             | –                         | 660,4      | 863,6   | 107,95  | 6   | 6                              | –               | 698,5 | 805,9               |
| Z-544428.ZL   | –                 | 2 NUP       | 195             | –                         | 660,4      | 866,775 | 114,3   | 6   | 6                              | –               | 705   | 805,5               |
| Z-544426.ZL   | –                 | 2 NUP       | 122             | –                         | 660,406    | 812,8   | 101,6   | 6   | 6                              | –               | 698,5 | 765,3               |
| Z-543432.ZL   | –                 | 2 NUP       | 134             | –                         | 666,75     | 812,8   | 120,65  | 5   | 5                              | –               | 696   | 769,5               |
| NJ18/670-M1   | –                 | 1           | 77,6            | –                         | 670        | 820     | 69      | 4   | 4                              | 7,8             | 712   | 772                 |
| NJ18/670-M1   | HJ18/670          | 1           | 77,6            | 10,9                      | 670        | 820     | 69      | 4   | 4                              | –               | 712   | 772                 |
| NJ18/670-M1A  | –                 | 1           | 77,6            | –                         | 670        | 820     | 69      | 4   | 4                              | 7,8             | 712   | 772                 |
| NJ18/670-M1A  | HJ18/670          | 1           | 77,6            | 10,9                      | 670        | 820     | 69      | 4   | 4                              | –               | 712   | 772                 |
| NJ28/670-M1   | –                 | 1           | 102             | –                         | 670        | 820     | 88      | 4   | 4                              | 8,7             | 712   | 772                 |
| NJ28/670-M1A  | –                 | 1           | 102             | –                         | 670        | 820     | 88      | 4   | 4                              | 8,7             | 712   | 772                 |
| NUP28/670-M1  | –                 | 1           | 103             | –                         | 670        | 820     | 88      | 4   | 4                              | –               | 712   | 772                 |
| NUP28/670-M1A | –                 | 1           | 103             | –                         | 670        | 820     | 88      | 4   | 4                              | –               | 712   | 772                 |
| NUP19/670-M1  | –                 | 1           | 194             | –                         | 670        | 900     | 103     | 6   | 6                              | –               | 731   | 817                 |
| NJ10/670-M1   | –                 | 1           | 356             | –                         | 670        | 980     | 136     | 7,5 | 7,5                            | 12,7            | 745   | 876,2               |
| NJ10/670-M1   | HJ10/670          | 1           | 356             | 35,1                      | 670        | 980     | 136     | 7,5 | 7,5                            | –               | 745   | 876,2               |
| NJ10/670-M1A  | –                 | 1           | 356             | –                         | 670        | 980     | 136     | 7,5 | 7,5                            | 12,7            | 745   | 876,2               |
| NJ10/670-M1A  | HJ10/670          | 1           | 356             | 35,1                      | 670        | 980     | 136     | 7,5 | 7,5                            | –               | 745   | 876,2               |
| Z-546109.ZL   | –                 | 2 NUP       | 161             | –                         | 673,1      | 838,2   | 117,475 | 5   | 5                              | –               | 712   | 787,2               |
| NJ18/710-M1   | –                 | 1           | 93,7            | –                         | 710        | 870     | 74      | 4   | 4                              | 7,9             | 753   | 820                 |
| NJ18/710-M1   | HJ18/710          | 1           | 93,7            | 12,6                      | 710        | 870     | 74      | 4   | 4                              | –               | 753   | 820                 |
| NJ18/710-M1A  | –                 | 1           | 93,7            | –                         | 710        | 870     | 74      | 4   | 4                              | 7,9             | 753   | 820                 |
| NJ18/710-M1A  | HJ18/710          | 1           | 93,7            | 12,6                      | 710        | 870     | 74      | 4   | 4                              | –               | 753   | 820                 |
| NJ28/710-M1   | –                 | 1           | 124             | –                         | 710        | 870     | 95      | 4   | 4                              | 8,7             | 753   | 820                 |
| NJ28/710-M1A  | –                 | 1           | 124             | –                         | 710        | 870     | 95      | 4   | 4                              | 8,7             | 753   | 820                 |
| NUP28/710-M1  | –                 | 1           | 126             | –                         | 710        | 870     | 95      | 4   | 4                              | –               | 753   | 820                 |
| NUP28/710-M1A | –                 | 1           | 126             | –                         | 710        | 870     | 95      | 4   | 4                              | –               | 753   | 820                 |
| NJ19/710-M1   | –                 | 1           | 218             | –                         | 710        | 950     | 106     | 6   | 6                              | 9,3             | 774   | 867,7               |
| NJ19/710-M1   | HJ19/710          | 1           | 218             | 26,4                      | 710        | 950     | 106     | 6   | 6                              | –               | 774   | 867,7               |
| NJ19/710-M1A  | –                 | 1           | 218             | –                         | 710        | 950     | 106     | 6   | 6                              | 9,3             | 774   | 867,7               |
| NJ19/710-M1A  | HJ19/710          | 1           | 218             | 26,4                      | 710        | 950     | 106     | 6   | 6                              | –               | 774   | 867,7               |

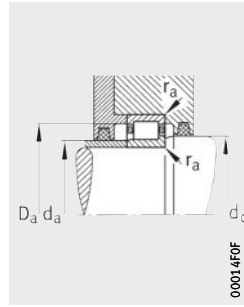
1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



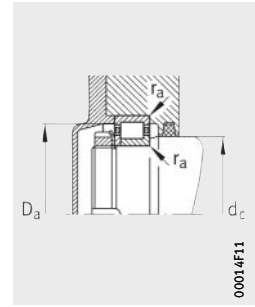
Design 2  
NUP  
Locating bearing



2) Axial displacement "s" for NJ



Mounting dimensions  
for NJ  
for NJ and HJ, page 375



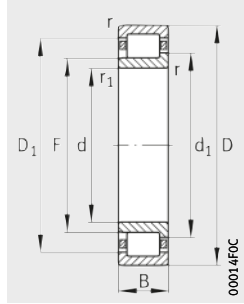
Mounting dimensions  
for NUP

|                |                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 728            | 31             | 55             | –              | 658                 | 694  | 734            | 892                | 6              | 6               | 3 250               | 6 200                 | 495                | 1 100             | 500               |
| 728            | –              | –              | –              | 658                 | 694  | 734            | 892                | 6              | 6               | 3 250               | 6 200                 | 495                | 1 100             | 500               |
| 728            | 31             | 55             | –              | 658                 | 694  | 734            | 892                | 6              | 6               | 3 250               | 6 200                 | 495                | 1 100             | 500               |
| 705,6          | –              | –              | 16,8           | –                   | –    | –              | –                  | 5              | 5               | 2 360               | 5 300                 | 385                | 1 200             | 360               |
| 714,3          | –              | –              | 14             | –                   | –    | –              | –                  | 5              | 5               | 2 400               | 6 300                 | 470                | 1 200             | 340               |
| 722,9          | –              | –              | 16,5           | –                   | –    | –              | –                  | 5              | 5               | 2 850               | 5 700                 | 405                | 1 100             | 360               |
| 727,5          | –              | –              | 14,7           | –                   | –    | –              | –                  | 5              | 5               | 3 100               | 6 700                 | 485                | 1 100             | 320               |
| 713,8          | –              | –              | 13,3           | –                   | –    | –              | –                  | 5              | 5               | 2 240               | 6 000                 | 435                | 1 200             | 340               |
| 713            | –              | –              | 10,3           | –                   | –    | –              | –                  | 4              | 4               | 3 050               | 8 000                 | 670                | 1 200             | –                 |
| 724            | –              | –              | –              | 685                 | 707  | 731            | 805                | 3              | 3               | 1 180               | 2 750                 | 220                | 1 400             | –                 |
| 724            | 20,5           | 37             | –              | 685                 | 707  | 731            | 805                | 3              | 3               | 1 180               | 2 750                 | 220                | 1 400             | –                 |
| 724            | –              | –              | –              | 685                 | 707  | 731            | 805                | 3              | 3               | 1 180               | 2 750                 | 220                | 1 400             | –                 |
| 724            | 20,5           | 37             | –              | 685                 | 707  | 731            | 805                | 3              | 3               | 1 180               | 2 750                 | 220                | 1 400             | –                 |
| 724            | –              | –              | –              | 685                 | 707  | 731            | 805                | 3              | 3               | 1 760               | 4 650                 | 385                | 1 200             | 400               |
| 724            | –              | –              | –              | 685                 | 707  | 731            | 805                | 3              | 3               | 1 760               | 4 650                 | 385                | 1 200             | 400               |
| 724            | –              | –              | 15             | 685                 | 707  | 731            | 805                | 3              | 3               | 1 760               | 4 650                 | 385                | 1 200             | 400               |
| 724            | –              | –              | 15             | 685                 | 707  | 731            | 805                | 3              | 3               | 1 760               | 4 650                 | 385                | 1 200             | 400               |
| 748,5          | –              | –              | 24,5           | 693                 | 726  | 757            | 877                | 5              | 5               | 2 040               | 4 250                 | 340                | 1 200             | –                 |
| 774,5          | –              | –              | –              | 698                 | 739  | 780            | 952                | 6              | 6               | 3 750               | 7 100                 | 540                | 950               | 450               |
| 774,5          | 31             | 56,5           | –              | 698                 | 739  | 780            | 952                | 6              | 6               | 3 750               | 7 100                 | 540                | 950               | 450               |
| 774,5          | –              | –              | –              | 698                 | 739  | 780            | 952                | 6              | 6               | 3 750               | 7 100                 | 540                | 950               | 450               |
| 774,5          | 31             | 56,5           | –              | 698                 | 739  | 780            | 952                | 6              | 6               | 3 750               | 7 100                 | 540                | 950               | 450               |
| 729,2          | –              | –              | 13,7           | –                   | –    | –              | –                  | 4              | 4               | 2 750               | 7 100                 | –                  | 700               | –                 |
| 766,5          | –              | –              | –              | 725                 | 748  | 774            | 855                | 3              | 3               | 1 400               | 3 250                 | 260                | 1 200             | –                 |
| 766,5          | 21             | 38             | –              | 725                 | 748  | 774            | 855                | 3              | 3               | 1 400               | 3 250                 | 260                | 1 200             | –                 |
| 766,5          | –              | –              | –              | 725                 | 748  | 774            | 855                | 3              | 3               | 1 400               | 3 250                 | 260                | 1 200             | –                 |
| 766,5          | 21             | 38             | –              | 725                 | 748  | 774            | 855                | 3              | 3               | 1 400               | 3 250                 | 260                | 1 200             | –                 |
| 766,5          | –              | –              | –              | 725                 | 748  | 774            | 855                | 3              | 3               | 2 080               | 5 500                 | 450                | 1 100             | 360               |
| 766,5          | –              | –              | –              | 725                 | 748  | 774            | 855                | 3              | 3               | 2 080               | 5 500                 | 450                | 1 100             | 360               |
| 766,5          | –              | –              | 15             | 725                 | 748  | 774            | 855                | 3              | 3               | 2 080               | 5 500                 | 450                | 1 100             | 360               |
| 766,5          | –              | –              | 15             | 725                 | 748  | 774            | 855                | 3              | 3               | 2 080               | 5 500                 | 450                | 1 100             | 360               |
| 795,1          | –              | –              | –              | 733                 | 769  | 800            | 927                | 5              | 5               | 2 240               | 4 750                 | 380                | 1 100             | –                 |
| 795,1          | 30             | 55             | –              | 733                 | 769  | 800            | 927                | 5              | 5               | 2 240               | 4 750                 | 380                | 1 100             | –                 |
| 795,1          | –              | –              | –              | 733                 | 769  | 800            | 927                | 5              | 5               | 2 240               | 4 750                 | 380                | 1 100             | –                 |
| 795,1          | 30             | 55             | –              | 733                 | 769  | 800            | 927                | 5              | 5               | 2 240               | 4 750                 | 380                | 1 100             | –                 |

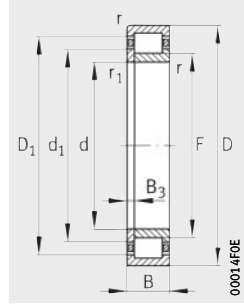


# Cylindrical roller bearings with cage

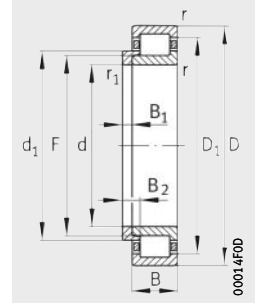
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing



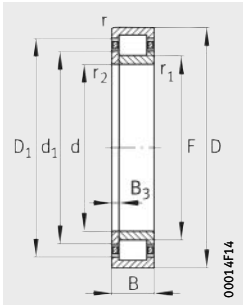
Design 1  
NJ and HJ  
Locating bearing

**Dimension table** (continued) · Dimensions in mm

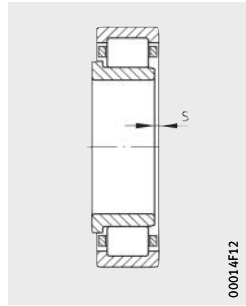
| Designation   |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |         |        |      |                                |                 |       |                |
|---------------|-------------------|-------------|----------------|--------------------------|------------|---------|--------|------|--------------------------------|-----------------|-------|----------------|
| Bearing       | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D       | B      | r    | r <sub>1</sub> /r <sub>2</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> |
|               |                   |             |                |                          |            |         |        | min. | min.                           |                 |       | ≈              |
| NUP19/710-M1  | –                 | 1           | 223            | –                        | 710        | 950     | 106    | 6    | 6                              | –               | 774   | 867,7          |
| NUP29/710-M1A | –                 | 1           | 297            | –                        | 710        | 950     | 140    | 6    | 6                              | –               | 770   | 866            |
| NJ10/710-M1   | –                 | 1           | 407            | –                        | 710        | 1030    | 140    | 7,5  | 7,5                            | 12,6            | 790   | 924,5          |
| NJ10/710-M1   | HJ10/710          | 1           | 407            | 42,1                     | 710        | 1030    | 140    | 7,5  | 7,5                            | –               | 790   | 924,5          |
| NJ10/710-M1A  | –                 | 1           | 407            | –                        | 710        | 1030    | 140    | 7,5  | 7,5                            | 12,6            | 790   | 924,5          |
| NJ10/710-M1A  | HJ10/710          | 1           | 407            | 42,1                     | 710        | 1030    | 140    | 7,5  | 7,5                            | –               | 790   | 924,5          |
| Z-544519.ZL   | –                 | 2 NUP       | 139            | –                        | 711,2      | 863,6   | 107,95 | 6    | 6                              | –               | 739,4 | 819,5          |
| Z-545611.ZL   | –                 | 2 NUP       | 194            | –                        | 711,2      | 914,4   | 107,95 | 6    | 3,5                            | –               | 752,5 | 853            |
| Z-549125.ZL   | –                 | 2 NUP       | 172            | –                        | 723,646    | 900,113 | 114,3  | 6    | 6                              | –               | 760   | 846,9          |
| Z-545997.ZL   | –                 | 2 NUP       | 183            | –                        | 723,9      | 901,7   | 120,65 | 7,5  | 7,5                            | –               | 760,8 | 847,6          |
| NJ18/750-M1   | –                 | 1           | 111            | –                        | 750        | 920     | 78     | 5    | 5                              | 8,8             | 799   | 866            |
| NJ18/750-M1   | HJ18/750          | 1           | 111            | 16,5                     | 750        | 920     | 78     | 5    | 5                              | –               | 799   | 866            |
| NJ18/750-M1A  | –                 | 1           | 112            | –                        | 750        | 920     | 78     | 5    | 5                              | 8,8             | 799   | 866            |
| NJ18/750-M1A  | HJ18/750          | 1           | 112            | 16,5                     | 750        | 920     | 78     | 5    | 5                              | –               | 799   | 866            |
| NJ28/750-M1   | –                 | 1           | 146            | –                        | 750        | 920     | 100    | 5    | 5                              | 10              | 799   | 866            |
| NJ28/750-M1A  | –                 | 1           | 146            | –                        | 750        | 920     | 100    | 5    | 5                              | 10              | 799   | 866            |
| NUP28/750-M1  | –                 | 1           | 149            | –                        | 750        | 920     | 100    | 5    | 5                              | –               | 799   | 866            |
| NUP28/750-M1A | –                 | 1           | 149            | –                        | 750        | 920     | 100    | 5    | 5                              | –               | 799   | 866            |
| NUP19/750-M1  | –                 | 1           | 256            | –                        | 750        | 1000    | 112    | 6    | 6                              | –               | 815   | 911            |
| NUP19/750-M1A | –                 | 1           | 256            | –                        | 750        | 1000    | 112    | 6    | 6                              | –               | 815   | 911            |
| NJ10/750-M1   | –                 | 1           | 489            | –                        | 750        | 1090    | 150    | 7,5  | 7,5                            | 13,6            | 835   | 978            |
| NJ10/750-M1   | HJ10/750          | 1           | 489            | 49,6                     | 750        | 1090    | 150    | 7,5  | 7,5                            | –               | 835   | 978            |
| NJ10/750-M1A  | –                 | 1           | 489            | –                        | 750        | 1090    | 150    | 7,5  | 7,5                            | 13,6            | 835   | 978            |
| NJ10/750-M1A  | HJ10/750          | 1           | 489            | 49,6                     | 750        | 1090    | 150    | 7,5  | 7,5                            | –               | 835   | 978            |
| NJ18/800-M1   | –                 | 1           | 132            | –                        | 800        | 980     | 82     | 5    | 5                              | 8,9             | 849   | 923            |
| NJ18/800-M1   | HJ18/800          | 1           | 134            | 18,5                     | 800        | 980     | 82     | 5    | 5                              | –               | 849   | 923            |
| NJ18/800-M1A  | –                 | 1           | 132            | –                        | 800        | 980     | 82     | 5    | 5                              | 8,9             | 849   | 923            |
| NJ18/800-M1A  | HJ18/800          | 1           | 132            | 18,5                     | 800        | 980     | 82     | 5    | 5                              | –               | 849   | 923            |
| NJ28/800-M1   | –                 | 1           | 177            | –                        | 800        | 980     | 106    | 5    | 5                              | 9,3             | 849   | 923            |
| NUP28/800-M1  | –                 | 1           | 179            | –                        | 800        | 980     | 106    | 5    | 5                              | –               | 849   | 923            |
| NJ19/800-M1   | –                 | 1           | 282            | –                        | 800        | 1060    | 115    | 6    | 6                              | 12,8            | 870   | 968,4          |
| NJ19/800-M1   | HJ19/800          | 1           | 282            | 34,2                     | 800        | 1060    | 115    | 6    | 6                              | –               | 870   | 968,4          |
| NJ19/800-M1A  | –                 | 1           | 282            | –                        | 800        | 1060    | 115    | 6    | 6                              | 12,8            | 870   | 968,4          |
| NJ19/800-M1A  | HJ19/800          | 1           | 282            | 34,2                     | 800        | 1060    | 115    | 6    | 6                              | –               | 870   | 968,4          |
| NUP19/800-M1  | –                 | 1           | 288            | –                        | 800        | 1060    | 115    | 6    | 6                              | –               | 870   | 968,4          |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

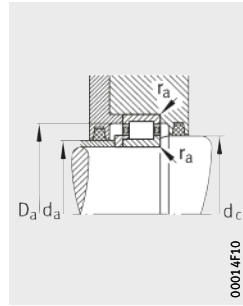




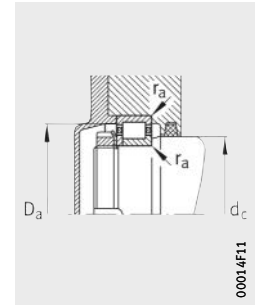
Design 2  
NUP  
Locating bearing



2) Axial displacement "s" for NJ

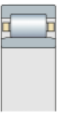


Mounting dimensions  
for NJ and HJ  
for NJ, page 377



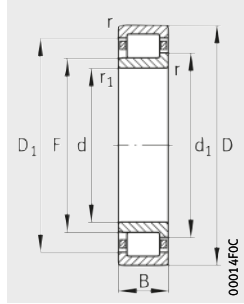
Mounting dimensions  
for NUP

|                |                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 795,1          | -              | -              | 25             | 733                 | 769  | 800            | 927                | 5              | 5               | 2 240               | 4 750                 | 380                | 1 100             | -                 |
| 789,5          | -              | -              | 20             | 733                 | 765  | 798            | 927                | 5              | 5               | 3 750               | 8 800                 | 710                | 1 000             | 320               |
| 819,5          | -              | -              | -              | 738                 | 784  | 824            | 1 002              | 6              | 6               | 4 050               | 8 000                 | 620                | 950               | 430               |
| 819,5          | 35             | 58             | -              | 738                 | 784  | 824            | 1 002              | 6              | 6               | 4 050               | 8 000                 | 620                | 950               | 430               |
| 819,5          | -              | -              | -              | 738                 | 784  | 824            | 1 002              | 6              | 6               | 4 050               | 8 000                 | 620                | 950               | 430               |
| 819,5          | 35             | 58             | -              | 738                 | 784  | 824            | 1 002              | 6              | 6               | 4 050               | 8 000                 | 620                | 950               | 430               |
| 757,6          | -              | -              | 14             | -                   | -    | -              | -                  | 5              | 5               | 2 750               | 6 800                 | 550                | 1 100             | -                 |
| 776,4          | -              | -              | 14             | -                   | -    | -              | -                  | 5              | 3               | 3 050               | 6 700                 | 475                | 1 100             | 300               |
| 779,7          | -              | -              | 18,2           | -                   | -    | -              | -                  | 5              | 5               | 2 800               | 6 700                 | 480                | 1 100             | 320               |
| 780,5          | -              | -              | 15,3           | -                   | -    | -              | -                  | 6              | 6               | 3 200               | 7 800                 | 560                | 1 100             | 300               |
| 812,5          | -              | -              | -              | 767                 | 794  | 820            | 903                | 4              | 4               | 1 430               | 3 450                 | 270                | 1 100             | -                 |
| 812,5          | 24             | 43             | -              | 767                 | 794  | 820            | 903                | 4              | 4               | 1 430               | 3 450                 | 270                | 1 100             | -                 |
| 812,5          | -              | -              | -              | 767                 | 794  | 820            | 903                | 4              | 4               | 1 430               | 3 450                 | 270                | 1 100             | -                 |
| 812,5          | 24             | 43             | -              | 767                 | 794  | 820            | 903                | 4              | 4               | 1 430               | 3 450                 | 270                | 1 100             | -                 |
| 812,5          | -              | -              | -              | 767                 | 790  | 816            | 903                | 4              | 4               | 2 160               | 5 850                 | 470                | 1 100             | 340               |
| 812,5          | -              | -              | -              | 767                 | 790  | 816            | 903                | 4              | 4               | 2 160               | 5 850                 | 470                | 1 100             | 340               |
| 812,5          | -              | -              | 17,5           | 767                 | 790  | 816            | 903                | 4              | 4               | 2 160               | 5 850                 | 470                | 1 100             | 340               |
| 812,5          | -              | -              | 17,5           | 767                 | 790  | 816            | 903                | 4              | 4               | 2 160               | 5 850                 | 470                | 1 100             | 340               |
| 834,5          | -              | -              | 26             | 773                 | 810  | 843            | 977                | 5              | 5               | 2 500               | 5 300                 | 415                | 1 100             | -                 |
| 834,5          | -              | -              | 26             | 773                 | 810  | 843            | 977                | 5              | 5               | 2 500               | 5 300                 | 415                | 1 100             | -                 |
| 866            | -              | -              | -              | 778                 | 829  | 872            | 1 062              | 6              | 6               | 4 500               | 9 000                 | 680                | 850               | 400               |
| 866            | 36             | 63,5           | -              | 778                 | 829  | 872            | 1 062              | 6              | 6               | 4 500               | 9 000                 | 680                | 850               | 400               |
| 866            | -              | -              | -              | 778                 | 829  | 872            | 1 062              | 6              | 6               | 4 500               | 9 000                 | 680                | 850               | 400               |
| 866            | 36             | 63,5           | -              | 778                 | 829  | 872            | 1 062              | 6              | 6               | 4 500               | 9 000                 | 680                | 850               | 400               |
| 864            | -              | -              | -              | 817                 | 844  | 872            | 963                | 4              | 4               | 1 760               | 4 150                 | 315                | 1 100             | -                 |
| 864            | 24,5           | 43             | -              | 817                 | 844  | 872            | 963                | 4              | 4               | 1 760               | 4 150                 | 315                | 1 100             | -                 |
| 864            | -              | -              | -              | 817                 | 844  | 872            | 963                | 4              | 4               | 1 760               | 4 150                 | 315                | 1 100             | -                 |
| 864            | 24,5           | 43             | -              | 817                 | 844  | 872            | 963                | 4              | 4               | 1 760               | 4 150                 | 315                | 1 100             | -                 |
| 864            | -              | -              | -              | 817                 | 844  | 872            | 963                | 4              | 4               | 2 700               | 7 200                 | 570                | 1 000             | 300               |
| 864            | -              | -              | 15,5           | 817                 | 844  | 872            | 963                | 4              | 4               | 2 700               | 7 200                 | 560                | 1 000             | 300               |
| 889,5          | -              | -              | -              | 823                 | 865  | 898            | 1 037              | 5              | 5               | 2 600               | 5 700                 | 445                | 1 000             | -                 |
| 889,5          | 31,5           | 59             | -              | 823                 | 865  | 898            | 1 037              | 5              | 5               | 2 600               | 5 700                 | 445                | 1 000             | -                 |
| 889,5          | -              | -              | -              | 823                 | 865  | 898            | 1 037              | 5              | 5               | 2 600               | 5 700                 | 445                | 1 000             | -                 |
| 889,5          | 31,5           | 59             | -              | 823                 | 865  | 898            | 1 037              | 5              | 5               | 2 600               | 5 700                 | 445                | 1 000             | -                 |
| 889,5          | -              | -              | 27,5           | 823                 | 865  | 898            | 1 037              | 5              | 5               | 2 600               | 5 700                 | 440                | 1 000             | -                 |

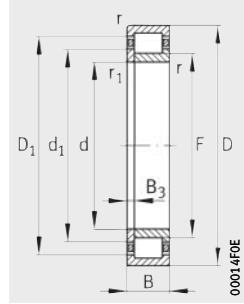


# Cylindrical roller bearings with cage

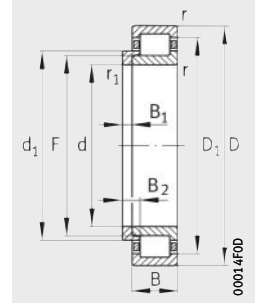
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

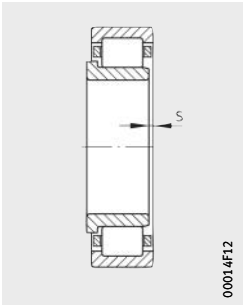


Design 1  
NJ and HJ  
Locating bearing

Dimension table (continued) · Dimensions in mm

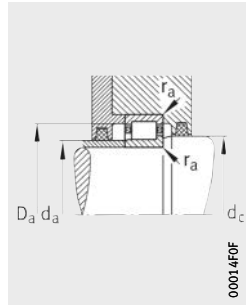
| Designation   |                   | De-<br>sign | Mass<br>m      |                          | Dimensions |      |      |      |                |                 |     |                |
|---------------|-------------------|-------------|----------------|--------------------------|------------|------|------|------|----------------|-----------------|-----|----------------|
| Bearing       | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d          | D    | B    | r    | r <sub>1</sub> | s <sup>2)</sup> | F   | D <sub>1</sub> |
|               |                   |             |                |                          |            |      | min. | min. |                |                 | ≈   |                |
| NUP19/800-M1A | –                 | 1           | 288            | –                        | 800        | 1060 | 115  | 6    | 6              | –               | 870 | 968,4          |
| NJ29/800-M1   | –                 | 1           | 383            | –                        | 800        | 1060 | 150  | 6    | 6              | 13,3            | 865 | 969            |
| NJ29/800-M1A  | –                 | 1           | 383            | –                        | 800        | 1060 | 150  | 6    | 6              | 13,3            | 865 | 969            |
| NUP29/800-M1  | –                 | 1           | 383            | –                        | 800        | 1060 | 150  | 6    | 6              | 13,3            | 865 | 969            |
| NJ10/800-M1   | –                 | 1           | 567            | –                        | 800        | 1150 | 155  | 7,5  | 7,5            | 13,6            | 885 | 1036           |
| NJ10/800-M1   | HJ10/800          | 1           | 567            | 56,5                     | 800        | 1150 | 155  | 7,5  | 7,5            | –               | 885 | 1036           |
| NJ10/800-M1A  | –                 | 1           | 567            | –                        | 800        | 1150 | 155  | 7,5  | 7,5            | 13,6            | 885 | 1036           |
| NJ10/800-M1A  | HJ10/800          | 1           | 567            | 56,5                     | 800        | 1150 | 155  | 7,5  | 7,5            | –               | 885 | 1036           |
| NJ18/850-M1   | –                 | 1           | 140            | –                        | 850        | 1030 | 82   | 5    | 5              | 9               | 895 | 970            |
| NJ18/850-M1   | HJ18/850          | 1           | 140            | 18,5                     | 850        | 1030 | 82   | 5    | 5              | –               | 895 | 970            |
| NJ18/850-M1A  | –                 | 1           | 140            | –                        | 850        | 1030 | 82   | 5    | 5              | 9               | 895 | 970            |
| NJ18/850-M1A  | HJ18/850          | 1           | 140            | 18,5                     | 850        | 1030 | 82   | 5    | 5              | –               | 895 | 970            |
| NJ28/850-M1   | –                 | 1           | 187            | –                        | 850        | 1030 | 106  | 5    | 5              | 9,3             | 895 | 970            |
| NJ28/850-M1   | HJ28/850          | 1           | 187            | 18,4                     | 850        | 1030 | 106  | 5    | 5              | –               | 895 | 970            |
| NJ28/850-M1A  | –                 | 1           | 187            | –                        | 850        | 1030 | 106  | 5    | 5              | 9,3             | 895 | 970            |
| NJ28/850-M1A  | HJ28/850          | 1           | 187            | 18,4                     | 850        | 1030 | 106  | 5    | 5              | –               | 895 | 970            |
| NUP28/850-M1  | –                 | 1           | 190            | –                        | 850        | 1030 | 106  | 5    | 5              | –               | 895 | 970            |
| NUP28/850-M1A | –                 | 1           | 190            | –                        | 850        | 1030 | 106  | 5    | 5              | –               | 895 | 970            |
| NJ19/850-M1   | –                 | 1           | 321            | –                        | 850        | 1120 | 118  | 6    | 6              | 12,6            | 921 | 1024,1         |
| NJ19/850-M1   | HJ19/850          | 1           | 321            | 39,7                     | 850        | 1120 | 118  | 6    | 6              | –               | 921 | 1024,1         |
| NJ29/850-M1   | –                 | 1           | 432            | –                        | 850        | 1120 | 155  | 6    | 6              | 8,6             | 917 | 1031,5         |
| NJ29/850-M1A  | –                 | 1           | 432            | –                        | 850        | 1120 | 155  | 6    | 6              | 8,6             | 917 | 1031,5         |
| NJ10/850-M1   | –                 | 1           | 669            | –                        | 850        | 1220 | 165  | 7,5  | 7,5            | 13,5            | 945 | 1096,2         |
| NJ10/850-M1   | HJ10/850          | 1           | 669            | 67,3                     | 850        | 1220 | 165  | 7,5  | 7,5            | –               | 945 | 1096,2         |
| NJ18/900-M1   | –                 | 1           | 163            | –                        | 900        | 1090 | 85   | 5    | 5              | 9               | 951 | 1031           |
| NJ18/900-M1   | HJ18/900          | 1           | 163            | 21,8                     | 900        | 1090 | 85   | 5    | 5              | –               | 951 | 1031           |
| NJ28/900-M1   | –                 | 1           | 220            | –                        | 900        | 1090 | 112  | 5    | 5              | 9,5             | 951 | 1031           |
| NJ28/900-M1A  | –                 | 1           | 220            | –                        | 900        | 1090 | 112  | 5    | 5              | 9,5             | 951 | 1031           |
| NUP28/900-M1  | –                 | 1           | 223            | –                        | 900        | 1090 | 112  | 5    | 5              | –               | 951 | 1031           |
| NUP28/900-M1A | –                 | 1           | 223            | –                        | 900        | 1090 | 112  | 5    | 5              | –               | 951 | 1031           |
| NJ29/900-M1   | –                 | 1           | 504            | –                        | 900        | 1180 | 165  | 6    | 6              | 13,3            | 970 | 1088           |
| NJ29/900-M1A  | –                 | 1           | 504            | –                        | 900        | 1180 | 165  | 6    | 6              | 13,3            | 970 | 1088           |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



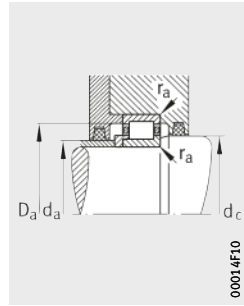
00014F12

2) Axial displacement "s" for NJ



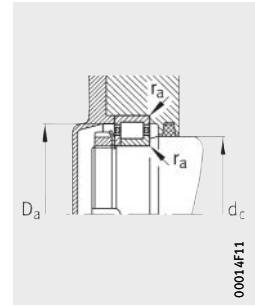
00014F0F

Mounting dimensions for NJ



00014F10

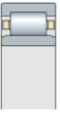
Mounting dimensions for NJ and HJ



00014F11

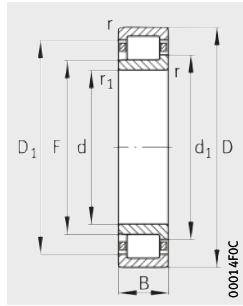
Mounting dimensions for NUP

|                |                |                |                | Mounting dimensions |      |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |      | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max. | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 889,5          | -              | -              | 27,5           | 823                 | 865  | 898            | 1 037              | 5              | 5               | 2 600               | 5 700                 | 440                | 1 000             | -                 |
| 886            | -              | -              | -              | 823                 | 860  | 895            | 1 037              | 5              | 5               | 4 250               | 10 000                | 780                | 900               | 280               |
| 886            | -              | -              | -              | 823                 | 860  | 895            | 1 037              | 5              | 5               | 4 250               | 10 000                | 780                | 900               | 280               |
| 886            | -              | -              | 22,5           | 823                 | 860  | 895            | 1 037              | 5              | 5               | 4 250               | 10 000                | 780                | 900               | 280               |
| 918            | -              | -              | -              | 828                 | 879  | 924            | 1 122              | 6              | 6               | 5 000               | 10 000                | 750                | 800               | 360               |
| 918            | 38             | 65,5           | -              | 828                 | 879  | 924            | 1 122              | 6              | 6               | 5 000               | 10 000                | 750                | 800               | 360               |
| 918            | -              | -              | -              | 828                 | 879  | 924            | 1 122              | 6              | 6               | 5 000               | 10 000                | 750                | 800               | 360               |
| 918            | 38             | 65,5           | -              | 828                 | 879  | 924            | 1 122              | 6              | 6               | 5 000               | 10 000                | 750                | 800               | 360               |
| 910            | -              | -              | -              | 867                 | 894  | 922            | 1 013              | 4              | 4               | 1 800               | 4 400                 | 330                | 1 000             | -                 |
| 910            | 24,5           | 43             | -              | 867                 | 894  | 922            | 1 013              | 4              | 4               | 1 800               | 4 400                 | 330                | 1 000             | -                 |
| 910            | -              | -              | -              | 867                 | 894  | 922            | 1 013              | 4              | 4               | 1 800               | 4 400                 | 330                | 1 000             | -                 |
| 910            | 24,5           | 43             | -              | 867                 | 894  | 922            | 1 013              | 4              | 4               | 1 800               | 4 400                 | 330                | 1 000             | -                 |
| 910            | -              | -              | -              | 867                 | 890  | 918            | 1 013              | 4              | 4               | 2 750               | 7 650                 | 590                | 950               | 280               |
| 910            | 25             | 40,5           | -              | 867                 | 890  | 918            | 1 013              | 4              | 4               | 2 750               | 7 650                 | 590                | 950               | 280               |
| 910            | -              | -              | -              | 867                 | 890  | 918            | 1 013              | 4              | 4               | 2 750               | 7 650                 | 590                | 950               | 280               |
| 910            | 25             | 40,5           | -              | 867                 | 890  | 918            | 1 013              | 4              | 4               | 2 750               | 7 650                 | 590                | 950               | 280               |
| 910            | -              | -              | 15,5           | 867                 | 890  | 918            | 1 013              | 4              | 4               | 2 750               | 7 650                 | 590                | 950               | 280               |
| 910            | -              | -              | 15,5           | 867                 | 890  | 918            | 1 013              | 4              | 4               | 2 750               | 7 650                 | 590                | 950               | 280               |
| 941,5          | -              | -              | -              | 873                 | 916  | 950            | 1 097              | 5              | 5               | 2 900               | 6 400                 | 490                | 950               | -                 |
| 941,5          | 34             | 61             | -              | 873                 | 916  | 950            | 1 097              | 5              | 5               | 2 900               | 6 400                 | 490                | 950               | -                 |
| 939            | -              | -              | -              | 873                 | 912  | 948            | 1 097              | 5              | 5               | 4 750               | 11 600                | 890                | 850               | 260               |
| 939            | -              | -              | -              | 873                 | 912  | 948            | 1 097              | 5              | 5               | 4 750               | 11 600                | 890                | 850               | 260               |
| 978            | -              | -              | -              | 878                 | 938  | 984            | 1 192              | 6              | 6               | 5 600               | 11 800                | 890                | 750               | 320               |
| 978            | 40             | 67,5           | -              | 878                 | 938  | 984            | 1 192              | 6              | 6               | 5 600               | 11 800                | 890                | 750               | 320               |
| 967            | -              | -              | -              | 917                 | 946  | 975            | 1 073              | 4              | 4               | 2 040               | 5 100                 | 370                | 950               | -                 |
| 967            | 24,5           | 43             | -              | 917                 | 946  | 975            | 1 073              | 4              | 4               | 2 040               | 5 100                 | 370                | 950               | -                 |
| 967            | -              | -              | -              | 917                 | 946  | 975            | 1 073              | 4              | 4               | 3 100               | 8 800                 | 660                | 850               | 260               |
| 967            | -              | -              | -              | 917                 | 946  | 975            | 1 073              | 4              | 4               | 3 100               | 8 800                 | 660                | 850               | 260               |
| 967            | -              | -              | 15,5           | 917                 | 946  | 975            | 1 073              | 4              | 4               | 3 100               | 8 800                 | 660                | 850               | 260               |
| 967            | -              | -              | 15,5           | 917                 | 946  | 975            | 1 073              | 4              | 4               | 3 100               | 8 800                 | 660                | 850               | 260               |
| 992            | -              | -              | -              | 923                 | 965  | 1 003          | 1 157              | 5              | 5               | 5 400               | 13 400                | 1 010              | 800               | 220               |
| 992            | -              | -              | -              | 923                 | 965  | 1 003          | 1 157              | 5              | 5               | 5 400               | 13 400                | 1 010              | 800               | 220               |

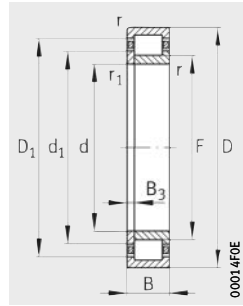


# Cylindrical roller bearings with cage

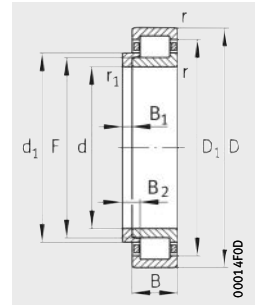
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

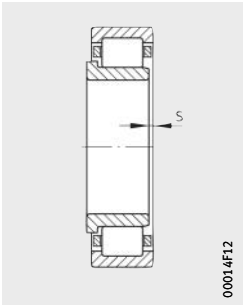


Design 1  
NJ and HJ  
Locating bearing

**Dimension table (continued)** · Dimensions in mm

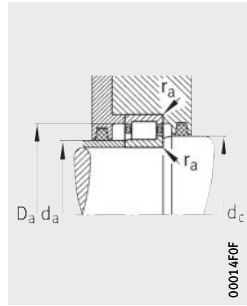
| Designation   |                   | De-<br>sign | Mass<br>m      |                          | Dimensions   |       |     |      |                |                 |       |                |
|---------------|-------------------|-------------|----------------|--------------------------|--------------|-------|-----|------|----------------|-----------------|-------|----------------|
| Bearing       | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d            | D     | B   | r    | r <sub>1</sub> | s <sup>2)</sup> | F     | D <sub>1</sub> |
|               |                   |             |                |                          |              |       |     | min. | min.           |                 |       | ≈              |
| NJ10/900-M1   | –                 | 1           | 740            | –                        | <b>900</b>   | 1 280 | 170 | 7,5  | 7,5            | 13,5            | 990   | 1 158          |
| NJ10/900-M1   | HJ10/900          | 1           | 740            | 75,5                     | <b>900</b>   | 1 280 | 170 | 7,5  | 7,5            | –               | 990   | 1 158          |
| NJ18/950-M1   | –                 | 1           | 192            | –                        | <b>950</b>   | 1 150 | 90  | 5    | 5              | 9,5             | 1 004 | 1 088          |
| NJ18/950-M1   | HJ18/950          | 1           | 192            | 26,3                     | <b>950</b>   | 1 150 | 90  | 5    | 5              | –               | 1 004 | 1 088          |
| NJ28/950-M1   | –                 | 1           | 261            | –                        | <b>950</b>   | 1 150 | 118 | 5    | 5              | 9,8             | 1 004 | 1 088          |
| NUP28/950-M1  | –                 | 1           | 265            | –                        | <b>950</b>   | 1 150 | 118 | 5    | 5              | –               | 1 004 | 1 088          |
| NJ29/950-M1   | –                 | 1           | 603            | –                        | <b>950</b>   | 1 250 | 175 | 7,5  | 7,5            | 14,5            | 1 025 | 1 151          |
| NJ10/950-M1   | –                 | 1           | 911            | –                        | <b>950</b>   | 1 360 | 180 | 7,5  | 7,5            | 13,5            | 1 055 | 1 223          |
| NJ10/950-M1   | HJ10/950          | 1           | 911            | 91,7                     | <b>950</b>   | 1 360 | 180 | 7,5  | 7,5            | –               | 1 055 | 1 223          |
| NJ18/1000-M   | –                 | 1           | 247            | –                        | <b>1 000</b> | 1 220 | 100 | 6    | 6              | 10,3            | 1 058 | 1 150          |
| NJ18/1000-M   | HJ18/1000         | 1           | 247            | 33,6                     | <b>1 000</b> | 1 220 | 100 | 6    | 6              | –               | 1 058 | 1 150          |
| NUP18/1000-M  | –                 | 1           | 252            | –                        | <b>1 000</b> | 1 220 | 100 | 6    | 6              | –               | 1 058 | 1 150          |
| NJ28/1000-M   | –                 | 1           | 328            | –                        | <b>1 000</b> | 1 220 | 128 | 6    | 6              | 11              | 1 058 | 1 150          |
| NUP28/1000-M  | –                 | 1           | 332            | –                        | <b>1 000</b> | 1 220 | 128 | 6    | 6              | –               | 1 058 | 1 150          |
| NUP28/1000-MA | –                 | 1           | 332            | –                        | <b>1 000</b> | 1 220 | 128 | 6    | 6              | –               | 1 058 | 1 150          |
| NJ10/1000-M1  | –                 | 1           | 1 030          | –                        | <b>1 000</b> | 1 420 | 185 | 7,5  | 7,5            | 14,5            | 1 105 | 1 281          |
| NJ10/1000-M1  | HJ10/1000         | 1           | 1 030          | 103                      | <b>1 000</b> | 1 420 | 185 | 7,5  | 7,5            | –               | 1 105 | 1 281          |
| NJ18/1060-M   | –                 | 1           | 264            | –                        | <b>1 060</b> | 1 280 | 100 | 6    | 6              | 10,3            | 1 118 | 1 210          |
| NJ18/1060-M   | HJ18/1060         | 1           | 264            | 37,6                     | <b>1 060</b> | 1 280 | 100 | 6    | 6              | –               | 1 118 | 1 210          |
| NJ28/1060-M   | –                 | 1           | 346            | –                        | <b>1 060</b> | 1 280 | 128 | 6    | 6              | 11              | 1 118 | 1 210          |
| NUP28/1060-M  | –                 | 1           | 350            | –                        | <b>1 060</b> | 1 280 | 128 | 6    | 6              | –               | 1 118 | 1 210          |
| NJ10/1060-M1  | –                 | 1           | 1 160          | –                        | <b>1 060</b> | 1 500 | 195 | 9,5  | 9,5            | 14,5            | 1 170 | 1 355          |
| NJ10/1060-M1  | HJ10/1060         | 1           | 1 160          | 121                      | <b>1 060</b> | 1 500 | 195 | 9,5  | 9,5            | –               | 1 170 | 1 355          |
| F-801007.ZL   | –                 | 1           | 324            | –                        | <b>1 120</b> | 1 360 | 106 | 6    | 6              | 11              | 1 185 | 1 286          |
| NJ18/1120-M   | –                 | 1           | 318            | –                        | <b>1 120</b> | 1 360 | 106 | 6    | 6              | 11              | 1 185 | 1 286          |
| NJ18/1120-M   | HJ18/1120         | 1           | 318            | 46,4                     | <b>1 120</b> | 1 360 | 106 | 6    | 6              | –               | 1 185 | 1 286          |
| NJ18/1120-MA  | –                 | 1           | 318            | –                        | <b>1 120</b> | 1 360 | 106 | 6    | 6              | 11              | 1 185 | 1 286          |
| NJ18/1120-MA  | HJ18/1120         | 1           | 318            | 46,4                     | <b>1 120</b> | 1 360 | 106 | 6    | 6              | –               | 1 185 | 1 286          |
| NJ28/1120-M   | –                 | 1           | 434            | –                        | <b>1 120</b> | 1 360 | 140 | 6    | 6              | 13,1            | 1 185 | 1 286          |
| NUP28/1120-M  | –                 | 1           | 441            | –                        | <b>1 120</b> | 1 360 | 140 | 6    | 6              | –               | 1 185 | 1 286          |
| NJ10/1120-M1  | –                 | 1           | 1 320          | –                        | <b>1 120</b> | 1 580 | 200 | 9,5  | 9,5            | 16              | 1 235 | 1 428          |
| NJ10/1120-M1  | HJ10/1120         | 1           | 1 320          | 138                      | <b>1 120</b> | 1 580 | 200 | 9,5  | 9,5            | –               | 1 235 | 1 428          |

<sup>1)</sup> Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



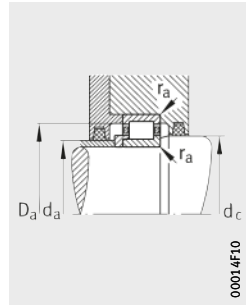
00014F12

2) Axial displacement "s" for NJ



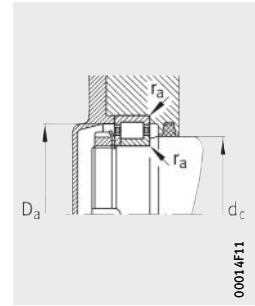
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Mounting dimensions for NJ



00014F10

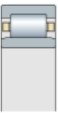
Mounting dimensions for NJ and HJ



00014F11

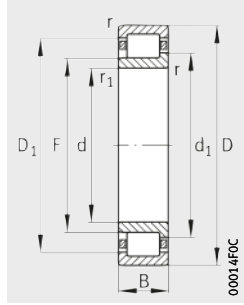
Mounting dimensions for NUP

|                |                |                |                | Mounting dimensions |       |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|-------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |       | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max.  | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 1 026          | -              | -              | -              | 928                 | 983   | 1 033          | 1 252              | 6              | 6               | 6 400               | 13 400                | 970                | 700               | 300               |
| 1 026          | 43             | 70,5           | -              | 928                 | 983   | 1 033          | 1 252              | 6              | 6               | 6 400               | 13 400                | 970                | 700               | 300               |
| 1 020          | -              | -              | -              | 967                 | 999   | 1 029          | 1 133              | 4              | 4               | 2 200               | 5 500                 | 405                | 900               | -                 |
| 1 020          | 27             | 47             | -              | 967                 | 999   | 1 029          | 1 133              | 4              | 4               | 2 200               | 5 500                 | 405                | 900               | -                 |
| 1 020          | -              | -              | -              | 967                 | 999   | 1 029          | 1 133              | 4              | 4               | 3 400               | 9 800                 | 740                | 800               | 240               |
| 1 020          | -              | -              | 16,5           | 967                 | 999   | 1 029          | 1 133              | 4              | 4               | 3 400               | 9 800                 | 740                | 800               | 240               |
| 1 049          | -              | -              | -              | 978                 | 1 020 | 1 060          | 1 222              | 6              | 6               | 5 850               | 14 600                | 1 090              | 750               | 220               |
| 1 091          | -              | -              | -              | 978                 | 1 048 | 1 098          | 1 332              | 6              | 6               | 7 200               | 15 600                | 1 120              | 700               | 260               |
| 1 091          | 45             | 72,5           | -              | 978                 | 1 048 | 1 098          | 1 332              | 6              | 6               | 7 200               | 15 600                | 1 120              | 700               | 260               |
| 1 076          | -              | -              | -              | 1 023               | 1 053 | 1 085          | 1 197              | 5              | 5               | 2 450               | 5 850                 | 435                | 850               | -                 |
| 1 076          | 30             | 52             | -              | 1 023               | 1 053 | 1 085          | 1 197              | 5              | 5               | 2 450               | 5 850                 | 435                | 850               | -                 |
| 1 076          | -              | -              | 22             | 1 023               | 1 053 | 1 085          | 1 197              | 5              | 5               | 2 450               | 5 850                 | 430                | 850               | -                 |
| 1 076          | -              | -              | -              | 1 023               | 1 053 | 1 085          | 1 197              | 5              | 5               | 3 650               | 10 000                | 750                | 750               | 220               |
| 1 076          | -              | -              | 19             | 1 023               | 1 053 | 1 085          | 1 197              | 5              | 5               | 3 650               | 10 000                | 750                | 750               | 220               |
| 1 076          | -              | -              | 19             | 1 023               | 1 053 | 1 085          | 1 197              | 5              | 5               | 3 650               | 10 000                | 750                | 750               | 220               |
| 1 143          | -              | -              | -              | 1 028               | 1 098 | 1 150          | 1 392              | 6              | 6               | 7 500               | 16 300                | 1 150              | 630               | 260               |
| 1 143          | 47             | 77             | -              | 1 028               | 1 098 | 1 150          | 1 392              | 6              | 6               | 7 500               | 16 300                | 1 150              | 630               | 260               |
| 1 136          | -              | -              | -              | 1 083               | 1 113 | 1 145          | 1 257              | 5              | 5               | 2 550               | 6 400                 | 465                | 800               | -                 |
| 1 136          | 32             | 54             | -              | 1 083               | 1 113 | 1 145          | 1 257              | 5              | 5               | 2 550               | 6 400                 | 465                | 800               | -                 |
| 1 136          | -              | -              | -              | 1 083               | 1 113 | 1 145          | 1 257              | 5              | 5               | 3 800               | 10 600                | 790                | 700               | 220               |
| 1 136          | -              | -              | 19             | 1 083               | 1 113 | 1 145          | 1 257              | 5              | 5               | 3 800               | 10 600                | 780                | 700               | 220               |
| 1 210          | -              | -              | -              | 1 094               | 1 163 | 1 217          | 1 466              | 8              | 8               | 8 500               | 18 600                | 1 300              | 600               | 220               |
| 1 210          | 50             | 80             | -              | 1 094               | 1 163 | 1 217          | 1 466              | 8              | 8               | 8 500               | 18 600                | 1 300              | 600               | 220               |
| 1 204          | -              | -              | -              | 1 143               | 1 180 | 1 214          | 1 337              | 5              | 5               | 2 850               | 7 100                 | 500                | 750               | -                 |
| 1 204          | -              | -              | -              | 1 143               | 1 180 | 1 214          | 1 337              | 5              | 5               | 2 850               | 7 100                 | 500                | 750               | -                 |
| 1 204          | 34             | 57             | -              | 1 143               | 1 180 | 1 214          | 1 337              | 5              | 5               | 2 850               | 7 100                 | 500                | 750               | -                 |
| 1 204          | -              | -              | -              | 1 143               | 1 180 | 1 214          | 1 337              | 5              | 5               | 2 850               | 7 100                 | 500                | 750               | -                 |
| 1 204          | 34             | 57             | -              | 1 143               | 1 180 | 1 214          | 1 337              | 5              | 5               | 2 850               | 7 100                 | 500                | 750               | -                 |
| 1 204          | -              | -              | -              | 1 143               | 1 180 | 1 214          | 1 337              | 5              | 5               | 4 150               | 11 600                | 840                | 700               | 200               |
| 1 204          | -              | -              | 22,5           | 1 143               | 1 180 | 1 214          | 1 337              | 5              | 5               | 4 150               | 11 600                | 840                | 700               | 200               |
| 1 276          | -              | -              | -              | 1 154               | 1 228 | 1 283          | 1 546              | 8              | 8               | 9 000               | 20 000                | 1 380              | 560               | 220               |
| 1 276          | 52             | 84,5           | -              | 1 154               | 1 228 | 1 283          | 1 546              | 8              | 8               | 9 000               | 20 000                | 1 380              | 560               | 220               |

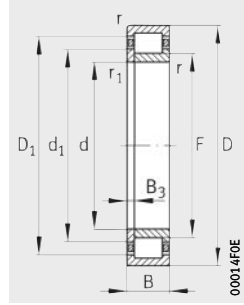


# Cylindrical roller bearings with cage

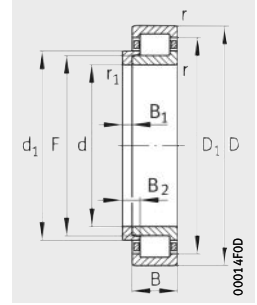
Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



Design 1  
NUP  
Locating bearing

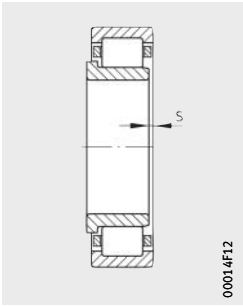


Design 1  
NJ and HJ  
Locating bearing

**Dimension table** (continued) · Dimensions in mm

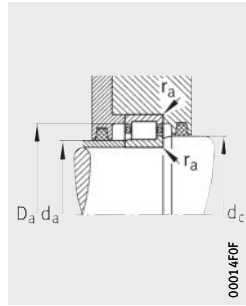
| Designation  |                   | De-<br>sign | Mass<br>m      |                          | Dimensions  |      |      |      |                |                 |      |                |
|--------------|-------------------|-------------|----------------|--------------------------|-------------|------|------|------|----------------|-----------------|------|----------------|
| Bearing      | L-section<br>ring |             | Bearing<br>≈kg | L-section<br>ring<br>≈kg | d           | D    | B    | r    | r <sub>1</sub> | s <sup>2)</sup> | F    | D <sub>1</sub> |
|              |                   |             |                |                          |             |      | min. | min. |                |                 |      | ≈              |
| NJ18/1180-M  | –                 | 1           | 339            | –                        | <b>1180</b> | 1420 | 106  | 6    | 6              | 11              | 1245 | 1346           |
| NJ18/1180-M  | HJ18/1180         | 1           | 339            | 48,8                     | <b>1180</b> | 1420 | 106  | 6    | 6              | –               | 1245 | 1346           |
| NJ18/1180-MA | –                 | 1           | 339            | –                        | <b>1180</b> | 1420 | 106  | 6    | 6              | 11              | 1245 | 1346           |
| NJ18/1180-MA | HJ18/1180         | 1           | 339            | 48,8                     | <b>1180</b> | 1420 | 106  | 6    | 6              | –               | 1245 | 1346           |
| NJ28/1180-M  | –                 | 1           | 460            | –                        | <b>1180</b> | 1420 | 140  | 6    | 6              | 13,1            | 1245 | 1346           |
| NUP28/1180-M | –                 | 1           | 467            | –                        | <b>1180</b> | 1420 | 140  | 6    | 6              | –               | 1245 | 1346           |
| NJ10/1180-M1 | –                 | 1           | 1540           | –                        | <b>1180</b> | 1660 | 212  | 9,5  | 9,5            | 17              | 1300 | 1502           |
| NJ10/1180-M1 | HJ10/1180         | 1           | 1540           | 158                      | <b>1180</b> | 1660 | 212  | 9,5  | 9,5            | –               | 1300 | 1502           |
| NJ18/1250-M  | –                 | 1           | 398            | –                        | <b>1250</b> | 1500 | 112  | 6    | 6              | 11,4            | 1316 | 1423,3         |
| NJ18/1250-M  | HJ18/1250         | 1           | 398            | 57,1                     | <b>1250</b> | 1500 | 112  | 6    | 6              | –               | 1316 | 1423,3         |
| NJ18/1250-MA | –                 | 1           | 398            | –                        | <b>1250</b> | 1500 | 112  | 6    | 6              | 11,4            | 1316 | 1423,3         |
| NJ18/1250-MA | HJ18/1250         | 1           | 398            | 57,1                     | <b>1250</b> | 1500 | 112  | 6    | 6              | –               | 1316 | 1423,3         |
| NJ28/1250-M  | –                 | 1           | 523            | –                        | <b>1250</b> | 1500 | 145  | 6    | 6              | 13,1            | 1316 | 1423,3         |
| NUP28/1250-M | –                 | 1           | 531            | –                        | <b>1250</b> | 1500 | 145  | 6    | 6              | –               | 1316 | 1423,3         |
| NJ10/1250-M1 | –                 | 1           | 1730           | –                        | <b>1250</b> | 1750 | 218  | 9,5  | 9,5            | 18,5            | 1375 | 1585           |
| NJ10/1250-M1 | HJ10/1250         | 1           | 1730           | 183                      | <b>1250</b> | 1750 | 218  | 9,5  | 9,5            | –               | 1375 | 1585           |
| NJ18/1320-M  | –                 | 1           | 506            | –                        | <b>1320</b> | 1600 | 122  | 6    | 6              | 12,8            | 1397 | 1511           |
| NJ18/1320-M  | HJ18/1320         | 1           | 506            | 75,8                     | <b>1320</b> | 1600 | 122  | 6    | 6              | –               | 1397 | 1511           |
| NJ18/1320-MA | –                 | 1           | 506            | –                        | <b>1320</b> | 1600 | 122  | 6    | 6              | 12,8            | 1397 | 1511           |
| NJ18/1320-MA | HJ18/1320         | 1           | 506            | 75,8                     | <b>1320</b> | 1600 | 122  | 6    | 6              | –               | 1397 | 1511           |
| NJ28/1320-M  | –                 | 1           | 713            | –                        | <b>1320</b> | 1600 | 165  | 6    | 6              | 15,8            | 1397 | 1511           |
| NUP28/1320-M | –                 | 1           | 724            | –                        | <b>1320</b> | 1600 | 165  | 6    | 6              | –               | 1397 | 1511           |
| NJ10/1320-M1 | –                 | 1           | 2070           | –                        | <b>1320</b> | 1850 | 230  | 12   | 12             | 19              | 1455 | 1673           |
| NJ10/1320-M1 | HJ10/1320         | 1           | 2070           | 217                      | <b>1320</b> | 1850 | 230  | 12   | 12             | –               | 1455 | 1673           |
| NJ18/1400-M  | –                 | 1           | 636            | –                        | <b>1400</b> | 1700 | 132  | 7,5  | 7,5            | 13,4            | 1480 | 1606           |
| NJ18/1400-MA | –                 | 1           | 636            | –                        | <b>1400</b> | 1700 | 132  | 7,5  | 7,5            | 13,4            | 1480 | 1606           |
| NJ28/1400-M  | –                 | 1           | 861            | –                        | <b>1400</b> | 1700 | 175  | 7,5  | 7,5            | 17              | 1480 | 1606           |
| NUP28/1400-M | –                 | 1           | 874            | –                        | <b>1400</b> | 1700 | 175  | 7,5  | 7,5            | –               | 1480 | 1606           |
| NJ10/1400-M1 | –                 | 1           | 2390           | –                        | <b>1400</b> | 1950 | 243  | 12   | 12             | 19,5            | 1540 | 1767           |
| NJ10/1400-M1 | HJ10/1400         | 1           | 2390           | 252                      | <b>1400</b> | 1950 | 243  | 12   | 12             | –               | 1540 | 1767           |

<sup>1)</sup> Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.



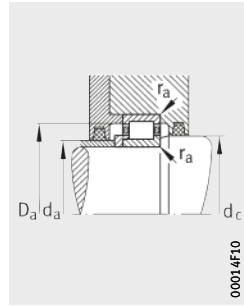
00014F12

2) Axial displacement "s" for NJ



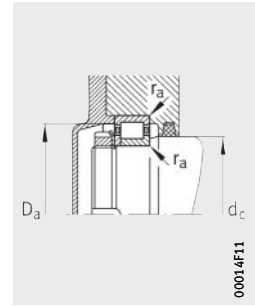
00014F0F

Mounting dimensions for NJ



00014F10

Mounting dimensions for NJ and HJ



00014F11

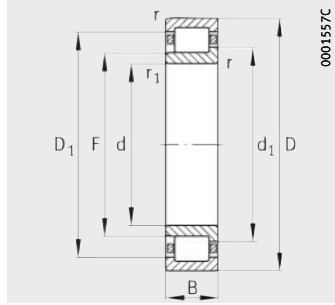
Mounting dimensions for NUP

|                |                |                |                | Mounting dimensions |       |                |                    |                |                 | Basic load ratings  |                       | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|----------------|----------------|---------------------|-------|----------------|--------------------|----------------|-----------------|---------------------|-----------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | d <sub>a</sub>      |       | d <sub>c</sub> | D <sub>a</sub>     | r <sub>a</sub> | r <sub>a1</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              |                |                |                | min. <sup>1)</sup>  | max.  | min.           | max. <sup>1)</sup> | max.           | max.            | kN                  | kN                    | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 1 264          | -              | -              | -              | 1 203               | 1 240 | 1 274          | 1 397              | 5              | 5               | 3 000               | 7 800                 | 540                | 700               | -                 |
| 1 264          | 34             | 57             | -              | 1 203               | 1 240 | 1 274          | 1 397              | 5              | 5               | 3 000               | 7 800                 | 540                | 700               | -                 |
| 1 264          | -              | -              | -              | 1 203               | 1 240 | 1 274          | 1 397              | 5              | 5               | 3 000               | 7 800                 | 540                | 700               | -                 |
| 1 264          | 34             | 57             | -              | 1 203               | 1 240 | 1 274          | 1 397              | 5              | 5               | 3 000               | 7 800                 | 540                | 700               | -                 |
| 1 264          | -              | -              | -              | 1 203               | 1 240 | 1 274          | 1 397              | 5              | 5               | 4 400               | 12 900                | 910                | 630               | 180               |
| 1 264          | -              | -              | 22,5           | 1 203               | 1 240 | 1 274          | 1 397              | 5              | 5               | 4 400               | 12 900                | 910                | 630               | 180               |
| 1 343          | -              | -              | -              | 1 214               | 1 293 | 1 350          | 1 626              | 8              | 8               | 10 000              | 22 800                | 1 500              | 560               | 200               |
| 1 343          | 54             | 87,5           | -              | 1 214               | 1 293 | 1 350          | 1 626              | 8              | 8               | 10 000              | 22 800                | 1 500              | 560               | 200               |
| 1 337          | -              | -              | -              | 1 273               | 1 311 | 1 347          | 1 477              | 5              | 5               | 3 350               | 8 650                 | 590                | 700               | -                 |
| 1 337          | 36             | 60             | -              | 1 273               | 1 311 | 1 347          | 1 477              | 5              | 5               | 3 350               | 8 650                 | 590                | 700               | -                 |
| 1 337          | -              | -              | -              | 1 273               | 1 311 | 1 347          | 1 477              | 5              | 5               | 3 350               | 8 650                 | 590                | 700               | -                 |
| 1 337          | 36             | 60             | -              | 1 273               | 1 311 | 1 347          | 1 477              | 5              | 5               | 3 350               | 8 650                 | 590                | 700               | -                 |
| 1 337          | -              | -              | -              | 1 273               | 1 311 | 1 347          | 1 477              | 5              | 5               | 5 000               | 14 300                | 1 010              | 600               | 170               |
| 1 337          | -              | -              | 22,5           | 1 273               | 1 311 | 1 347          | 1 477              | 5              | 5               | 5 000               | 14 300                | 1 010              | 600               | 170               |
| 1 419          | -              | -              | -              | 1 284               | 1 368 | 1 427          | 1 716              | 8              | 8               | 10 600              | 24 500                | 1 590              | 530               | 180               |
| 1 419          | 57             | 93,5           | -              | 1 284               | 1 368 | 1 427          | 1 716              | 8              | 8               | 10 600              | 24 500                | 1 590              | 530               | 180               |
| 1 419          | -              | -              | -              | 1 243               | 1 392 | 1 429          | 1 577              | 5              | 5               | 3 800               | 10 200                | 670                | 630               | -                 |
| 1 419          | 40             | 67             | -              | 1 243               | 1 392 | 1 429          | 1 577              | 5              | 5               | 3 800               | 10 200                | 670                | 630               | -                 |
| 1 419          | -              | -              | -              | 1 243               | 1 392 | 1 429          | 1 577              | 5              | 5               | 3 800               | 10 200                | 670                | 630               | -                 |
| 1 419          | 40             | 67             | -              | 1 243               | 1 392 | 1 429          | 1 577              | 5              | 5               | 3 800               | 10 200                | 670                | 630               | -                 |
| 1 419          | -              | -              | -              | 1 343               | 1 392 | 1 429          | 1 577              | 5              | 5               | 5 700               | 17 000                | 1 150              | 560               | 150               |
| 1 419          | -              | -              | 27,5           | 1 343               | 1 392 | 1 429          | 1 577              | 5              | 5               | 5 700               | 17 000                | 1 150              | 560               | 150               |
| 1 501          | -              | -              | -              | 1 362               | 1 448 | 1 509          | 1 808              | 10             | 10              | 11 800              | 27 000                | 1 750              | 500               | 170               |
| 1 501          | 60             | 97,5           | -              | 1 362               | 1 448 | 1 509          | 1 808              | 10             | 10              | 11 800              | 27 000                | 1 750              | 500               | 170               |
| 1 504          | -              | -              | -              | 1 428               | 1 475 | 1 515          | 1 672              | 6              | 6               | 4 550               | 12 000                | 780                | 600               | -                 |
| 1 504          | -              | -              | -              | 1 428               | 1 475 | 1 515          | 1 672              | 6              | 6               | 4 550               | 12 000                | 780                | 600               | -                 |
| 1 504          | -              | -              | -              | 1 428               | 1 475 | 1 515          | 1 672              | 6              | 6               | 6 550               | 19 300                | 1 280              | 530               | 140               |
| 1 504          | -              | -              | 30             | 1 428               | 1 475 | 1 515          | 1 672              | 6              | 6               | 6 550               | 19 300                | 1 280              | 530               | 140               |
| 1 587          | -              | -              | -              | 1 442               | 1 533 | 1 595          | 1 908              | 10             | 10              | 13 200              | 31 000                | 1 980              | 480               | 150               |
| 1 587          | 63             | 102            | -              | 1 442               | 1 533 | 1 595          | 1 908              | 10             | 10              | 13 200              | 31 000                | 1 980              | 480               | 150               |

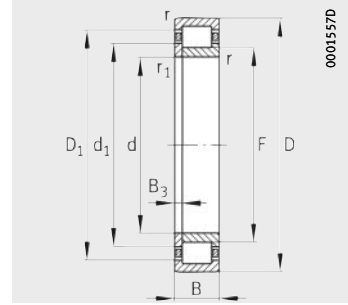


# Cylindrical roller bearings with cage

Single row  
Semi-locating and  
locating bearings



Design 1  
NJ  
Semi-locating bearing



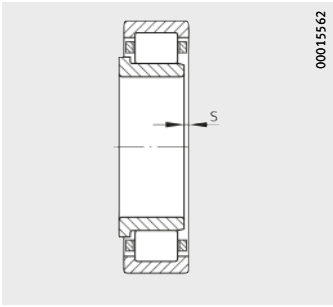
Design 1  
NUP  
Locating bearing

**Dimension table** (continued) · Dimensions in mm

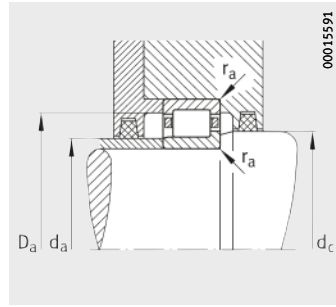
| Designation          | Design | Mass<br>m<br>Bearing<br>≈kg | Dimensions  |      |     |      |                |                 |      |                |                |                |
|----------------------|--------|-----------------------------|-------------|------|-----|------|----------------|-----------------|------|----------------|----------------|----------------|
|                      |        |                             | d           | D    | B   | r    | r <sub>1</sub> | s <sup>2)</sup> | F    | D <sub>1</sub> | d <sub>1</sub> | B <sub>3</sub> |
| Bearing              |        |                             |             |      |     | min. | min.           |                 |      | ≈              | ≈              |                |
| <b>NJ18/1500-M</b>   | 1      | 765                         | <b>1500</b> | 1820 | 140 | 7,5  | 7,5            | 14,5            | 1585 | 1719           | 1611           | –              |
| <b>NJ28/1500-M</b>   | 1      | 1030                        | <b>1500</b> | 1820 | 185 | 7,5  | 7,5            | 19,3            | 1585 | 1719           | 1611           | –              |
| <b>NUP28/1500-M</b>  | 1      | 1040                        | <b>1500</b> | 1820 | 185 | 7,5  | 7,5            | –               | 1585 | 1719           | 1611           | 32,5           |
| <b>NJ18/1600-M</b>   | 1      | 1000                        | <b>1600</b> | 1950 | 155 | 7,5  | 7,5            | 15,5            | 1690 | 1841           | 1719           | –              |
| <b>NJ28/1600-M</b>   | 1      | 1300                        | <b>1600</b> | 1950 | 200 | 7,5  | 7,5            | 20              | 1690 | 1841           | 1719           | –              |
| <b>NJ28/1600-MA</b>  | 1      | 1300                        | <b>1600</b> | 1950 | 200 | 7,5  | 7,5            | 20              | 1690 | 1841           | 1719           | –              |
| <b>NUP28/1600-M</b>  | 1      | 1320                        | <b>1600</b> | 1950 | 200 | 7,5  | 7,5            | –               | 1690 | 1841           | 1719           | 35             |
| <b>NUP28/1600-MA</b> | 1      | 1320                        | <b>1600</b> | 1950 | 200 | 7,5  | 7,5            | –               | 1690 | 1841           | 1719           | 35             |
| <b>NJ18/1700-M</b>   | 1      | 1100                        | <b>1700</b> | 2060 | 160 | 7,5  | 7,5            | 15,5            | 1790 | 1950           | 1820           | –              |
| <b>NJ18/1700-MA</b>  | 1      | 1100                        | <b>1700</b> | 2060 | 160 | 7,5  | 7,5            | 15,5            | 1790 | 1950           | 1820           | –              |
| <b>NUP18/1700-MA</b> | 1      | 1130                        | <b>1700</b> | 2060 | 160 | 7,5  | 7,5            | –               | 1790 | 1950           | 1820           | 32,5           |
| <b>NJ18/1800-M</b>   | 1      | 1270                        | <b>1800</b> | 2180 | 165 | 9,5  | 9,5            | 13              | 1895 | 2063           | 1927           | –              |
| <b>NJ18/1800-MA</b>  | 1      | 1270                        | <b>1800</b> | 2180 | 165 | 9,5  | 9,5            | 13              | 1895 | 2063           | 1927           | –              |
| <b>NJ28/1800-M</b>   | 1      | 1720                        | <b>1800</b> | 2180 | 218 | 9,5  | 9,5            | 17              | 1895 | 2063           | 1927           | –              |
| <b>NJ28/1800-MA</b>  | 1      | 1720                        | <b>1800</b> | 2180 | 218 | 9,5  | 9,5            | 17              | 1895 | 2063           | 1927           | –              |
| <b>NJ18/1900-M</b>   | 1      | 1500                        | <b>1900</b> | 2300 | 175 | 9,5  | 9,5            | 17              | 2000 | 2176           | 2034           | –              |
| <b>NJ18/2000-M</b>   | 1      | 1890                        | <b>2000</b> | 2430 | 190 | 9,5  | 9,5            | 19              | 2110 | 2295           | 2147           | –              |

1) Under axial load, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

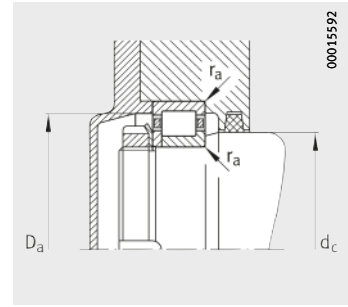




2) Axial displacement "s"  
for NJ

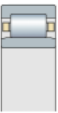


Mounting dimensions  
for NJ



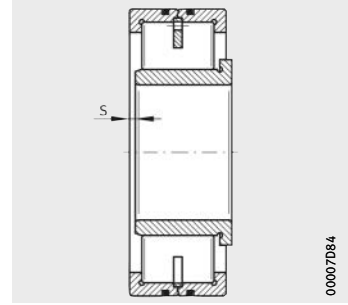
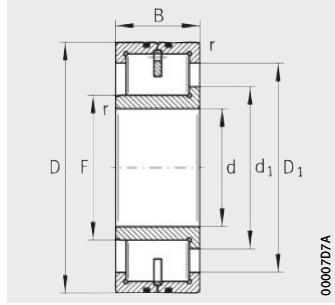
Mounting dimensions  
for NUP

| Mounting dimensions |       |       |                    |       |          | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------|-------|--------------------|-------|----------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$               |       | $d_c$ | $D_a$              | $r_a$ | $r_{a1}$ | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
| min. <sup>1)</sup>  | max.  | min.  | max. <sup>1)</sup> | max.  | max.     |                     |                         |                                      |  |   |
| 1 528               | 1 580 | 1 619 | 1 792              | 6     | 6        | 5 200               | 14 000                  | 870                                  | 560  | –   |
| 1 528               | 1 580 | 1 619 | 1 792              | 6     | 6        | 7 350               | 21 600                  | 1 390                                | 500  | 130   |
| 1 528               | 1 580 | 1 619 | 1 792              | 6     | 6        | 7 350               | 21 600                  | 1 380                                | 500  | 130   |
| 1 628               | 1 685 | 1 727 | 1 922              | 6     | 6        | 6 200               | 16 300                  | 1 020                                | 530  | –   |
| 1 628               | 1 685 | 1 727 | 1 922              | 6     | 6        | 8 300               | 24 000                  | 1 540                                | 480  | 120   |
| 1 628               | 1 685 | 1 727 | 1 922              | 6     | 6        | 8 300               | 24 000                  | 1 540                                | 480  | 120   |
| 1 628               | 1 685 | 1 727 | 1 922              | 6     | 6        | 8 300               | 24 000                  | 1 540                                | 480  | 120   |
| 1 628               | 1 685 | 1 727 | 1 922              | 6     | 6        | 8 300               | 24 000                  | 1 540                                | 480  | 120   |
| 1 728               | 1 785 | 1 829 | 2 032              | 6     | 6        | 6 950               | 18 600                  | 1 150                                | 500  | –   |
| 1 728               | 1 785 | 1 829 | 2 032              | 6     | 6        | 6 950               | 18 600                  | 1 150                                | 500  | –   |
| 1 728               | 1 785 | 1 829 | 2 032              | 6     | 6        | 6 950               | 18 600                  | 1 140                                | 500  | –   |
| 1 834               | 1 890 | 1 936 | 2 146              | 8     | 8        | 7 800               | 20 800                  | 1 260                                | 480  | –   |
| 1 834               | 1 890 | 1 936 | 2 146              | 8     | 8        | 7 800               | 20 800                  | 1 260                                | 480  | –   |
| 1 834               | 1 890 | 1 936 | 2 146              | 8     | 8        | 11 400              | 34 500                  | 2 130                                | 450  | 90  |
| 1 834               | 1 890 | 1 936 | 2 146              | 8     | 8        | 11 400              | 34 500                  | 2 130                                | 450  | 90  |
| 1 934               | 1 995 | 2 042 | 2 266              | 8     | 8        | 8 500               | 23 200                  | 1 370                                | 450  | –   |
| 2 034               | 2 105 | 2 154 | 2 396              | 8     | 8        | 9 300               | 26 000                  | 1 520                                | 450  | –   |



# Cylindrical roller bearings with disc cage

Single row  
Semi-locating bearings

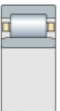


1) Axial displacement "s"

**Dimension table** - Dimensions in mm

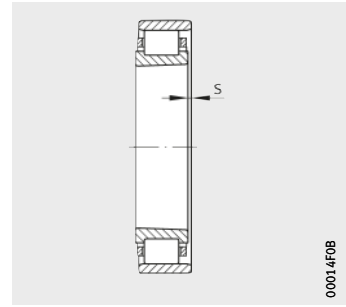
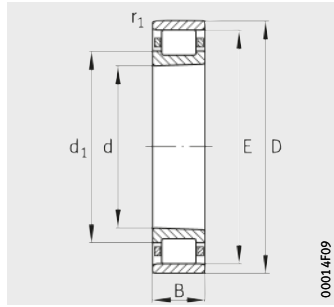
| Designation         | Mass<br>m<br>≈kg | Dimensions |     |     |           |                 |        |
|---------------------|------------------|------------|-----|-----|-----------|-----------------|--------|
|                     |                  | d          | D   | B   | r<br>min. | s <sup>1)</sup> | F      |
| <b>LSL192330-TB</b> | 40,7             | <b>150</b> | 320 | 108 | 4         | 7               | 182,49 |
| <b>LSL192332-TB</b> | 48,1             | <b>160</b> | 340 | 114 | 4         | 7               | 196,38 |
| <b>LSL192334-TB</b> | 57,5             | <b>170</b> | 360 | 120 | 4         | 7               | 230,55 |
| <b>LSL192336-TB</b> | 67,4             | <b>180</b> | 380 | 126 | 4         | 7               | 221,56 |
| <b>LSL192338-TB</b> | 78,1             | <b>190</b> | 400 | 132 | 5         | 7               | 224,43 |
| <b>LSL192340-TB</b> | 89,3             | <b>200</b> | 420 | 138 | 5         | 7               | 238,45 |
| <b>LSL192344-TB</b> | 108              | <b>220</b> | 460 | 145 | 5         | 7               | 266,71 |
| <b>LSL192348-TB</b> | 138,6            | <b>240</b> | 500 | 155 | 5         | 10              | 280,55 |
| <b>LSL192352-TB</b> | 168              | <b>260</b> | 540 | 165 | 6         | 10              | 315,6  |
| <b>LSL192356-TB</b> | 206,6            | <b>280</b> | 580 | 175 | 6         | 12              | 333,1  |
| <b>LSL192360-TB</b> | 253              | <b>300</b> | 620 | 185 | 7,5       | 12              | 350,93 |

|                |                | Basic load ratings     |                          | Fatigue limit load | Limiting speed    | Reference speed   |
|----------------|----------------|------------------------|--------------------------|--------------------|-------------------|-------------------|
| d <sub>1</sub> | D <sub>1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈              | ≈              | kN                     | kN                       | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 203,3          | 263,9          | 1 410                  | 1 760                    | 199                | 4 250             | 2 020             |
| 219            | 284,8          | 1 600                  | 2 010                    | 224                | 3 950             | 1 820             |
| 226,6          | 295,4          | 1 740                  | 2 210                    | 241                | 3 800             | 1 760             |
| 245            | 313,3          | 1 840                  | 2 430                    | 260                | 3 600             | 1 620             |
| 250            | 325,5          | 2 100                  | 2 750                    | 295                | 3 450             | 1 540             |
| 265,7          | 345,9          | 2 340                  | 3 050                    | 315                | 3 250             | 1 420             |
| 297            | 385,9          | 2 500                  | 3 200                    | 320                | 2 900             | 1 270             |
| 312,5          | 406,1          | 2 750                  | 3 550                    | 350                | 2 750             | 1 220             |
| 351,6          | 457,2          | 3 350                  | 4 350                    | 425                | 2 470             | 1 010             |
| 371            | 485            | 3 700                  | 4 850                    | 460                | 2 330             | 950               |
| 390,9          | 508,5          | 4 150                  | 5 500                    | 510                | 2 220             | 890               |



# Super precision cylindrical roller bearings

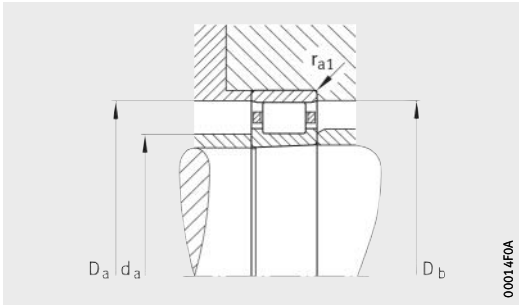
Single row,  
with tapered bore  
(taper 1:12)  
Non-locating bearings



1) Axial displacement "s"

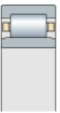
**Dimension table** - Dimensions in mm

| Designation            | Mass<br>m<br>≈kg | Dimensions |     |     |                        |                 |     |                |
|------------------------|------------------|------------|-----|-----|------------------------|-----------------|-----|----------------|
|                        |                  | d          | D   | B   | r <sub>1</sub><br>min. | s <sup>1)</sup> | E   | d <sub>1</sub> |
| <b>N1044-K-M1-SP</b>   | 21,8             | <b>220</b> | 340 | 56  | 3                      | 8               | 310 | 261,7          |
| <b>N1948-K-M1-SP</b>   | 8,18             | <b>240</b> | 320 | 38  | 2,1                    | 3,5             | 299 | 268,5          |
| <b>N1048-K-M1-SP</b>   | 19,3             | <b>240</b> | 360 | 56  | 3                      | 8               | 330 | 281,7          |
| <b>N1952-K-M1-SP</b>   | 13,8             | <b>260</b> | 360 | 46  | 2,1                    | 3,8             | 334 | 295,4          |
| <b>N1052-K-M1-SP</b>   | 28,8             | <b>260</b> | 400 | 65  | 4                      | 10              | 364 | 309,3          |
| <b>N1956-K-M1-SP</b>   | 14,6             | <b>280</b> | 380 | 46  | 2,1                    | 5,4             | 354 | 315,4          |
| <b>N1056-K-M1-SP</b>   | 30,5             | <b>280</b> | 420 | 65  | 4                      | 10              | 384 | 329,3          |
| <b>N1960-K-M1-SP</b>   | 23,6             | <b>300</b> | 420 | 56  | 3                      | 4,8             | 390 | 341,6          |
| <b>N1060-K-M1-SP</b>   | 43,3             | <b>300</b> | 460 | 74  | 4                      | 10              | 420 | 355,7          |
| <b>N1964-K-M1-SP</b>   | 24,9             | <b>320</b> | 440 | 56  | 3                      | 4,8             | 410 | 361,7          |
| <b>N1064-K-M1-SP</b>   | 45,7             | <b>320</b> | 480 | 74  | 4                      | 10              | 440 | 375,7          |
| <b>N1968-K-M1-SP</b>   | 26,3             | <b>340</b> | 460 | 56  | 3                      | 4,8             | 430 | 381,6          |
| <b>N1068-K-M1-SP</b>   | 60,7             | <b>340</b> | 520 | 82  | 5                      | 12              | 475 | 402,7          |
| <b>N1972-K-M1-SP</b>   | 26,9             | <b>360</b> | 480 | 56  | 3                      | 4,8             | 450 | 401,6          |
| <b>N1072-K-M1-SP</b>   | 64,4             | <b>360</b> | 540 | 82  | 5                      | 8,9             | 495 | 421,6          |
| <b>N1976-K-M1-SP</b>   | 40               | <b>380</b> | 520 | 65  | 4                      | 6               | 484 | 429,1          |
| <b>N1076-K-M1-SP</b>   | 66,6             | <b>380</b> | 560 | 82  | 5                      | 12              | 515 | 441,6          |
| <b>N1980-K-M1-SP</b>   | 41               | <b>400</b> | 540 | 65  | 4                      | 6               | 504 | 449,1          |
| <b>N1080-K-M1-SP</b>   | 88,1             | <b>400</b> | 600 | 90  | 5                      | 9,5             | 550 | 469,7          |
| <b>N1984-K-M1-SP</b>   | 42,9             | <b>420</b> | 560 | 65  | 4                      | 6               | 524 | 469,1          |
| <b>N1084-K-M1-SP</b>   | 90,7             | <b>420</b> | 620 | 90  | 5                      | 12,5            | 570 | 489,7          |
| <b>N1988-K-M1-SP</b>   | 60,2             | <b>440</b> | 600 | 74  | 4                      | 6,5             | 558 | 496,6          |
| <b>N1088-K-M1-SP</b>   | 106              | <b>440</b> | 650 | 94  | 6                      | 13              | 597 | 513,5          |
| <b>N1992-K-M1-SP</b>   | 61,1             | <b>460</b> | 620 | 74  | 4                      | 6,5             | 578 | 516,6          |
| <b>N1092-K-M1-SP</b>   | 120              | <b>460</b> | 680 | 100 | 6                      | 14              | 624 | 536,5          |
| <b>N1996-K-M1-SP</b>   | 73,1             | <b>480</b> | 650 | 78  | 5                      | 6,8             | 605 | 540            |
| <b>N1096-K-M1-SP</b>   | 125              | <b>480</b> | 700 | 100 | 6                      | 14              | 644 | 556,4          |
| <b>N19/500-K-M1-SP</b> | 74,5             | <b>500</b> | 670 | 78  | 5                      | 6,8             | 625 | 560            |
| <b>N10/500-K-M1-SP</b> | 130              | <b>500</b> | 720 | 100 | 6                      | 14              | 664 | 576,5          |

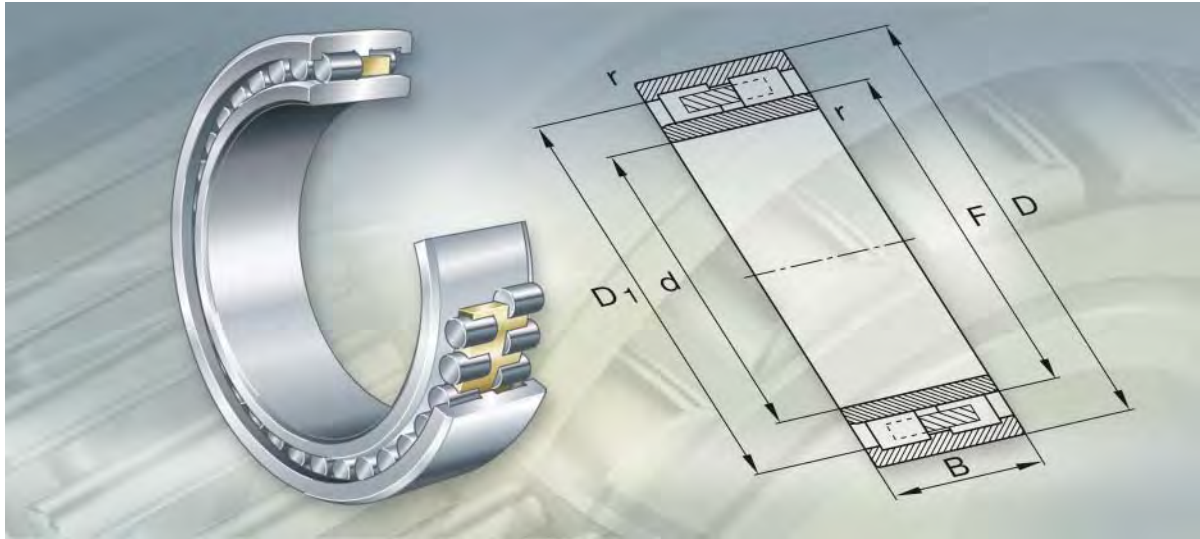


Mounting dimensions

| Mounting dimensions |              |               |                  | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speeds                   |                                |
|---------------------|--------------|---------------|------------------|---------------------|-------------------------|--------------------------------------|-----------------------------------|--------------------------------|
| $d_a$<br>h12        | $D_a$<br>H12 | $D_b$<br>min. | $r_{a1}$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      | $n_G$ grease<br>$\text{min}^{-1}$ | $n_G$ Oil<br>$\text{min}^{-1}$ |
| 232,4               | 328          | 313           | 2,5              | 510                 | 765                     | 100                                  | 2 400                             | 2 800                          |
| 250,5               | 309          | 302           | 2                | 280                 | 490                     | 62                                   | 2 400                             | 2 800                          |
| 252,5               | 348          | 333           | 2,5              | 540                 | 850                     | 107                                  | 2 200                             | 2 600                          |
| 270,5               | 349          | 337           | 2                | 425                 | 735                     | 73                                   | 2 000                             | 2 400                          |
| 275                 | 385          | 367           | 3                | 655                 | 1 020                   | 104                                  | 1 900                             | 2 200                          |
| 290,5               | 369          | 357           | 2                | 440                 | 800                     | 78                                   | 1 900                             | 2 200                          |
| 295                 | 405          | 387           | 3                | 430                 | 980                     | 225                                  | 1 800                             | 2 000                          |
| 312,5               | 408          | 394           | 2,5              | 600                 | 1 020                   | 123                                  | 1 700                             | 1 900                          |
| 315                 | 445          | 424           | 3                | 900                 | 1 430                   | 173                                  | 1 600                             | 1 800                          |
| 332,5               | 428          | 414           | 2,5              | 620                 | 1 100                   | 130                                  | 1 600                             | 1 800                          |
| 335                 | 465          | 444           | 3                | 915                 | 1 500                   | 178                                  | 1 500                             | 1 700                          |
| 352,5               | 448          | 434           | 2,5              | 655                 | 1 200                   | 140                                  | 1 500                             | 1 700                          |
| 358                 | 503          | 479           | 4                | 1 120               | 1 830                   | 211                                  | 1 400                             | 1 600                          |
| 372,5               | 468          | 454           | 2,5              | 655                 | 1 220                   | 142                                  | 1 400                             | 1 600                          |
| 378                 | 523          | 499           | 4                | 1 140               | 1 900                   | 217                                  | 1 300                             | 1 500                          |
| 395                 | 505          | 488           | 3                | 815                 | 1 500                   | 175                                  | 1 300                             | 1 500                          |
| 398                 | 543          | 519           | 4                | 1 180               | 2 000                   | 224                                  | 1 300                             | 1 500                          |
| 415                 | 525          | 509           | 3                | 800                 | 1 500                   | 140                                  | 1 300                             | 1 500                          |
| 418                 | 583          | 555           | 4                | 1 370               | 2 320                   | 260                                  | 1 200                             | 1 400                          |
| 435                 | 545          | 529           | 3                | 830                 | 1 600                   | 182                                  | 1 200                             | 1 400                          |
| 438                 | 603          | 575           | 4                | 1 400               | 2 450                   | 270                                  | 1 100                             | 1 300                          |
| 455                 | 585          | 563           | 3                | 1 020               | 1 960                   | 216                                  | 1 100                             | 1 300                          |
| 463                 | 627          | 602           | 5                | 1 560               | 2 750                   | 300                                  | 1 100                             | 1 300                          |
| 475                 | 605          | 583           | 3                | 1 020               | 1 960                   | 214                                  | 1 100                             | 1 300                          |
| 483                 | 657          | 629           | 5                | 1 660               | 3 000                   | 325                                  | 1 000                             | 1 200                          |
| 498                 | 633          | 610           | 4                | 1 140               | 2 240                   | 243                                  | 1 000                             | 1 200                          |
| 503                 | 677          | 649           | 5                | 1 700               | 3 100                   | 330                                  | 950                               | 1 100                          |
| 518                 | 653          | 631           | 4                | 1 160               | 2 320                   | 247                                  | 1 000                             | 1 200                          |
| 523                 | 697          | 670           | 5                | 1 760               | 3 200                   | 340                                  | 950                               | 1 100                          |



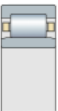
**FAG**



**Double row cylindrical roller bearings  
with cage**

# Double row cylindrical roller bearings with cage

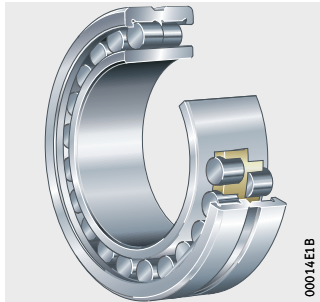
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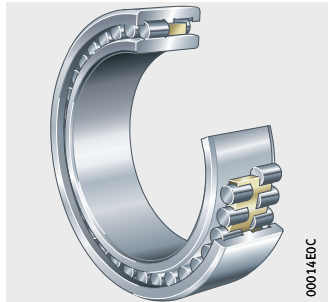
# Product overview Double row cylindrical roller bearings with cage

## Non-locating bearings With cylindrical bore

NNU40, NNU48, NNU49,  
Z-5..ZL2-01

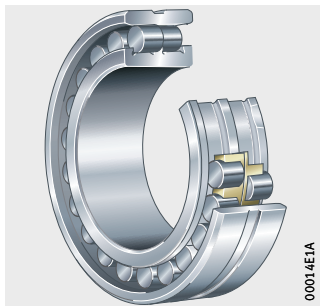


NNU41, Z-5..ZL2-01

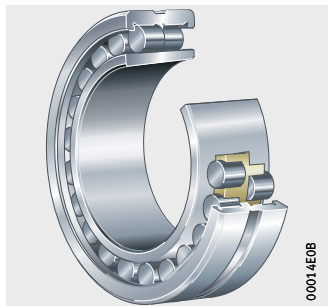


## With tapered bore

NN30..-AS-K-M-SP



NNU49..-S-K-M-SP



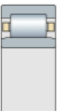


# Double row cylindrical roller bearings with cage

- Features** These double row cylindrical roller bearings comprise solid bearing rings and cylindrical roller and cage assemblies with solid cages.
- The bearings are suitable for very high radial loads and high speeds. They are separable and are therefore easier to mount and dismount. As a result, both bearing rings can be given a tight fit. All the designs described are non-locating bearings, since one of the bearing rings in each case is without ribs.

## Double row cylindrical roller bearings with cylindrical bore

- Design 1
- Outer ring with three rigid ribs, inner ring without ribs, lubrication groove and lubrication holes in the outer ring, brass double comb cage
  - Bearings of dimension series 49 with standardised main dimensions and designations, in some cases in tolerance class P5, for high speed work rolls in rolling mills
  - Non-standardised bearings (Z-5..ZL) with normal accuracy
  - Application:
    - for example in rolling mills and plastics calenders.
- Design 2
- Outer ring with three rigid ribs, inner ring without ribs, no lubrication groove and lubrication holes in the outer ring, brass double comb cage
  - Bearings of series NNU41 or special bearings (Z-5..ZL)
  - Application:
    - for example in grinding track mills.



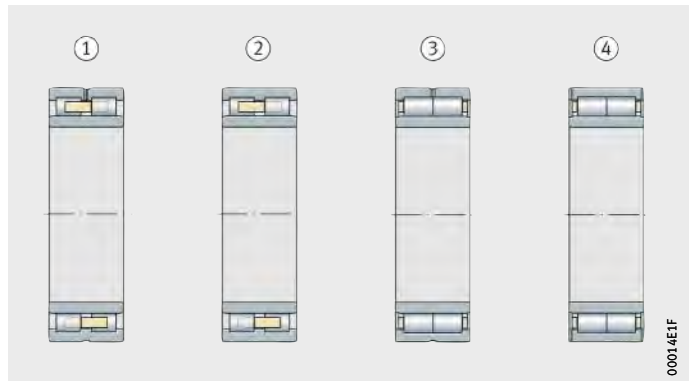
## Double row cylindrical roller bearings with cage

- Design 3 ■ Special bearings (Z-5..ZL):
- outer ring with two rigid ribs, inner ring without ribs, lubrication groove and lubrication holes in the outer ring
  - brass or steel window cage.
- Design 4 ■ Special bearings (Z-5..ZL):
- outer ring with two rigid ribs, inner ring without ribs, lubrication grooves on the end faces of the outer ring
  - brass or steel window cage.

Bearings with cylindrical bore of Design 1 to 4, *Figure 1*.

- ① Design 1  
② Design 2  
③ Design 3  
④ Design 4

*Figure 1*  
Double row  
cylindrical roller bearings  
with cylindrical bore

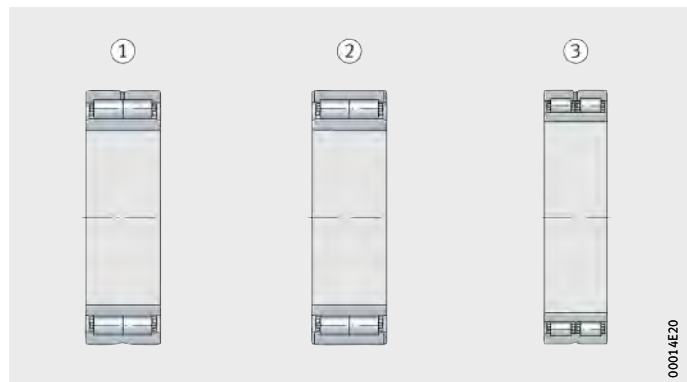


- Design 5
  - Special bearings:
    - outer ring with two rigid ribs, inner ring without ribs, lubrication groove and lubrication holes in the outer ring
    - steel pin cage and through-drilled rollers
  - Application:
    - for example in rolling mills and plastics calenders.
  
- Design 6
  - Special bearings:
    - outer ring with two rigid ribs, inner ring without ribs, lubrication grooves on the end faces of the outer ring
    - steel pin cage and through-drilled rollers
  - Application:
    - for example in rolling mills and plastics calenders.
  
- Design 7
  - Special bearings:
    - outer ring with three rigid ribs, inner ring without ribs, lubrication groove and lubrication holes in the outer ring
    - steel pin cage
  - Application:
    - for example in rolling mills and plastics calenders.

Bearings with cylindrical bore of Design 5 to 7, *Figure 2*.

- ① Design 5
- ② Design 6
- ③ Design 7

*Figure 2*  
Double row  
cylindrical roller bearings  
with cylindrical bore  
(continued)



# Double row cylindrical roller bearings with cage

## Double row cylindrical roller bearings with tapered bore

Double row cylindrical roller bearings with tapered bore (taper 1:12) are super precision bearings for machine tools. The radial internal clearance can be set to an optimum value during mounting. The bearings are suitable for particularly high speeds. They have a lubrication groove and lubrication holes in the outer ring.

- Design 8
  - Bearings of series NN30...-AS-K-M-SP have a ribless outer ring and an inner ring with three rigid ribs.
  - Each row of rollers has a separate solid brass cage.
- Design 9
  - In bearings of series NNU49...-S-K-M-SP, the outer ring has three rigid ribs, while the inner ring is without ribs.
  - The bearings have a brass double comb cage.

Bearings with tapered bore of Design 8 and 9, *Figure 3*.

- ① Series NN30...-AS-K-M-SP (Design 8)
- ② Series NNU49...-S-K-M-SP (Design 9)

*Figure 3*  
Double row cylindrical roller bearings with tapered bore



## Non-locating bearings

All the double row cylindrical roller bearings described here are non-locating bearings and can support radial forces only. Axial forces are supported by additional axial bearings, for example in the case of super precision bearings by double direction axial angular contact ball bearings.

## Axial displacement

The outer and inner ring can be axially displaced relative to each other from the central position by the values “s” stated in the dimension tables.

**Sealing** The bearings are supplied without seals.

**Lubrication** The bearings can be lubricated from the end faces using grease or oil. Some designs have a lubrication groove and lubrication holes in the outer ring. In the case of standardised bearings, this is indicated by the suffix S. Some special bearings have lubrication grooves in the outer ring end faces.

**Operating temperature** The double row cylindrical roller bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .



For continuous operation above  $+120\text{ }^{\circ}\text{C}$ , please contact us.

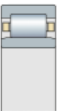
**Cages** Many double row cylindrical roller bearings have roller-guided solid cages made from brass, while some special bearings have cages made from steel.

Special bearings of Designs 5 to 7 have solid pin cages made from steel and through-drilled rollers. These bearings are designed for extremely high load carrying capacity and strong acceleration or deceleration, which occur for example in reversing roll stands.

**Suffixes** Suffixes for available designs: see table.

**Available designs**

| Suffix | Description  | Design                                      |
|--------|--|---|
| A      | Modified internal construction                         | Standard                                    |
| C2     | Radial internal clearance smaller than normal          | Special design, available by agreement only |
| C3     | Radial internal clearance larger than normal           |   |
| K      | Tapered bore, taper 1:12                               | Standard                                    |
| M      | Solid brass cage, guided by rollers                    |   |
| P5     | Tolerance class P5                                     | Special design, available by agreement only |
| S      | Lubrication groove and lubrication holes in outer ring | Standard                                    |
| SP     | Tolerance class SP                                     |   |



# Double row cylindrical roller bearings with cage

## Design and safety guidelines

### Permissible skewing

The permissible misalignment of the inner ring relative to the outer ring in double row cylindrical roller bearings is very limited.

### Minimum radial load

In continuous operation, a minimum radial load of the order of  $F_{r\ min} = C_{Or}/60$  is necessary.



If  $F_{r\ min} < C_{Or}/60$ , please contact us.

### Equivalent dynamic bearing load

For bearings under dynamic loading used as non-locating bearings, the following applies:

$$P = F_r$$

P kN

Equivalent dynamic bearing load

$F_r$  kN

Radial dynamic bearing load.

## Operating life of super precision bearings

Super precision bearings must guide machine parts with very high precision and support forces at up to very high speeds.

They are selected predominantly from the perspectives of:

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners.

Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life  $L_{10}$  in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0r}$  kN  
Radial static bearing load.

## Static load safety factor of super precision bearings

$$S_0 = \frac{C_{0r}}{P_0}$$

$S_0$  –  
Static load safety factor  
 $C_{0r}$  kN  
Basic static load rating, see dimension tables  
 $P_0$  kN  
Equivalent static bearing load.



In order to achieve sufficiently smooth running, the static load safety factor for super precision bearings should be  $S_0 > 3$ .

## Speeds of super precision bearings



The achievable speed depends on the radial internal clearance while warm from operation.

For calculation, the values from the dimension table are multiplied by the correction factor, see table.

## Correction factors

| Clearance or preload in operation<br>$\mu\text{m}$ | Correction factor |
|--|-------------------|
| 0 to 5 (clearance)                                 | 1 to 1,1          |
| -5 to 0 (preload)                                  | 0,8 to 1          |



The limiting speeds  $n_G$  in the dimension tables for super precision bearings are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

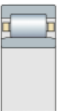
## Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

## Mounting dimensions

The dimension tables give the maximum dimensions of the radii  $r_a$  and  $r_{a1}$  and the diameters of the abutment shoulders.



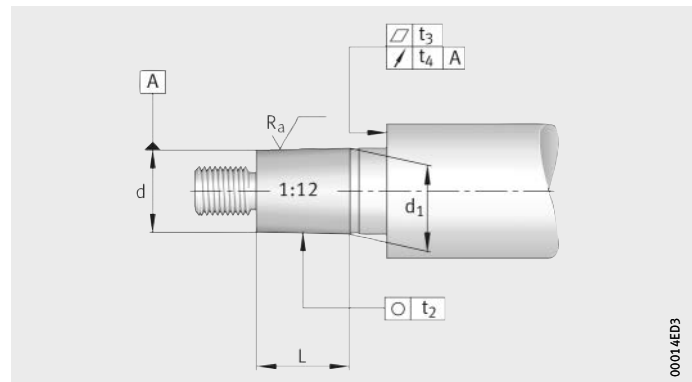
# Double row cylindrical roller bearings with cage

## Tapered shafts for super precision bearings

### Tapered shaft

Recommendations for machining of the tapered shaft: see table and *Figure 4*.

| Shaft diameter |       |  |      | Roundness<br>$t_2$<br>$\mu\text{m}$ | Flatness<br>$t_3$<br>$\mu\text{m}$ | Axial runout<br>$t_4$<br>$\mu\text{m}$ | Mean roughness<br>$R_a$<br>$\mu\text{m}$ |
|----------------|-------|--|------|-------------------------------------|------------------------------------|--|--|
| d<br>mm        |       | Deviation of small taper diameter<br>$\mu\text{m}$ |      |                                     |                                    |  |  |
| over           | incl. | max.   | min. |                                     |                                    |  |  |
| 200            | 225   | +405   | +385 | 3                                   | 3                                  | 4,5                                    | 0,2                                      |
| 225            | 250   | +445   | +425 | 3                                   | 3                                  | 4,5                                    | 0,2                                      |
| 250            | 280   | +498   | +475 | 4                                   | 4                                  | 6                                      | 0,4                                      |
| 280            | 315   | +548   | +525 | 4                                   | 4                                  | 6                                      | 0,4                                      |
| 315            | 355   | +615   | +590 | 5                                   | 5                                  | 7                                      | 0,4                                      |
| 355            | 400   | +685   | +660 | 5                                   | 5                                  | 7                                      | 0,4                                      |
| 400            | 450   | +767   | +740 | 6                                   | 6                                  | 8                                      | 0,4                                      |
| 450            | 500   | +847   | +820 | 6                                   | 6                                  | 8                                      | 0,4                                      |



*Figure 4*  
Design of shaft

00014ED3



The deviation of the taper angle of the shaft seat for bearings of tolerance class SP is shown in the table:

#### Deviation of taper angle

| Taper length L<br>mm   |                         | Taper angle tolerance AT <sub>D</sub><br>μm |      |                  |      |
|------------------------|-------------------------|---|------|------------------|------|
| L <sub>U</sub><br>over | L <sub>O</sub><br>incl. | AT <sub>DU</sub>                            |      | AT <sub>DO</sub> |      |
|                        |                         | max.  | min. | max.             | min. |
| 40                     | 63                      | +3,2  | 0    | +5               | 0    |
| 63                     | 100                     | +4  | 0    | +6,3             | 0    |
| 100                    | 160                     | +5  | 0    | +8               | 0    |
| 160                    | 250                     | +3,2  | 0    | +10              | 0    |

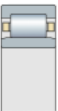
The taper angle tolerance AT<sub>D</sub> applies vertical to the axis and is defined as the differential diameter. If FAG taper gauges MGK132 are used, the values for the tolerance AT<sub>D</sub> should be halved (inclination angle tolerance). For taper lengths with nominal dimensions between the values listed in the table, the taper angle tolerance AT<sub>D</sub> should be determined by interpolation.

**Calculation example** Taper length of shaft seat 50 mm, tolerance class SP.

$$AT_D = AT_{DU} + \frac{AT_{DO} - AT_{DU}}{L_O - L_U} \cdot (L - L_U)$$

$$AT_D = 3,2 + \frac{5 - 3,2}{63 - 40} \cdot (50 - 40) = 3,98 \mu\text{m}$$

Taper angle tolerance AT<sub>D</sub> = +4 μm.



# Double row cylindrical roller bearings with cage

## Housings for super precision bearings

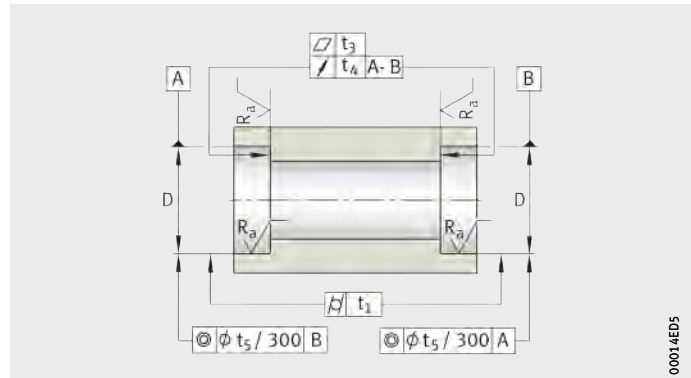


In order to allow mounting and dismounting of the bearings, the dimension  $D_{b \min}$  in the dimension tables must be observed.

Recommendations for machining of the housings: see table and *Figure 5*.

## Housing bores for super precision bearings

| Housing bore |       |                         |      | Cylindricity        | Flatness            | Axial runout        | Coaxiality          | Mean roughness      |
|--------------|-------|-------------------------|------|---------------------|---------------------|---------------------|---------------------|---------------------|
| D mm         |       | Deviation $\mu\text{m}$ |      | $t_1$ $\mu\text{m}$ | $t_3$ $\mu\text{m}$ | $t_4$ $\mu\text{m}$ | $t_5$ $\mu\text{m}$ | $R_a$ $\mu\text{m}$ |
| over         | incl. | max.                    | min. |                     |                     |                     |                     |                     |
| 250          | 315   | +3                      | -20  | 6                   | 6                   | 8                   | 12                  | 1,6                 |
| 315          | 400   | +3                      | -22  | 7                   | 7                   | 9                   | 13                  | 1,6                 |
| 400          | 500   | +2                      | -25  | 8                   | 8                   | 10                  | 15                  | 1,6                 |
| 500          | 630   | 0                       | -29  | 9                   | 9                   | 11                  | 16                  | 1,6                 |
| 630          | 800   | 0                       | -32  | 10                  | 10                  | 12                  | 18                  | 1,6                 |



*Figure 5*  
Design of housing

00014ED5

**Accuracy** The dimensional and running tolerances of the bearings with cylindrical bore correspond to tolerance class PN and in some cases also to P5 to DIN 620.

Super precision bearings correspond to the more stringent tolerance class SP. Bearings of tolerance class UP are available by agreement.

**Width tolerances SP**

| Bore    |       | Width deviation<br>(in relation to bore) |      | Width<br>variation<br>$V_{Bs}$<br>$\mu\text{m}$ |
|---------|-------|--|------|---|
| d<br>mm |       | $\Delta_{Bs}$<br>$\mu\text{m}$           |      |   |
| over    | incl. | max.                                     | min. |   |
| 180     | 250   | 0  | -300 | 6   |
| 250     | 315   | 0  | -350 | 8   |
| 315     | 400   | 0  | -400 | 10  |
| 400     | 500   | 0  | -450 | 12  |

**Inner ring tolerances SP**

| Bore    |       | Bore deviation                  |   |   |   | Variation<br>$V_{dp}$<br>$\mu\text{m}$ | Radial<br>runout<br>$K_{ia}$<br>$\mu\text{m}$ | Axial runout           |                           |
|---------|-------|---------------------------------|---|---|---|--|---|------------------------|---------------------------|
| d<br>mm |       | $\Delta_{dmp}$<br>$\mu\text{m}$ |   | $\Delta_{d1mp} - \Delta_{dmp}$<br>$\mu\text{m}$ |   |  |   | $S_d$<br>$\mu\text{m}$ | $S_{ia}$<br>$\mu\text{m}$ |
| over    | incl. |                                 |   |   |   |  |   |                        |                           |
| 180     | 250   | 30                              | 0 | 9   | 0 | 8                                      | 8   | 7                      | 8                         |
| 250     | 315   | 35                              | 0 | 11  | 0 | 9                                      | 8   | 8                      | 10                        |
| 315     | 400   | 40                              | 0 | 12  | 0 | 12                                     | 10  | 10                     | 12                        |
| 400     | 500   | 45                              | 0 | 14  | 0 | 14                                     | 10  | 12                     | 15                        |

**Outer ring tolerances SP**

| Outside diameter |       | Outside diameter<br>deviation  |     | Variation<br>$V_{Dp}$<br>$\mu\text{m}$ | Radial<br>runout<br>$K_{ea}$<br>$\mu\text{m}$ | Axial runout           |                           |
|------------------|-------|--------------------------------|-----|--|---|------------------------|---------------------------|
| D<br>mm          |       | $\Delta_{Ds}$<br>$\mu\text{m}$ |     |  |   | $S_D$<br>$\mu\text{m}$ | $S_{ea}$<br>$\mu\text{m}$ |
| over             | incl. |                                |     |  |   |                        |                           |
| 250              | 315   | 0                              | -18 | 9                                      | 11  | 8                      | 10                        |
| 315              | 400   | 0                              | -20 | 10                                     | 13  | 10                     | 13                        |
| 400              | 500   | 0                              | -23 | 12                                     | 15  | 11                     | 15                        |
| 500              | 630   | 0                              | -28 | 14                                     | 17  | 13                     | 18                        |
| 630              | 800   | 0                              | -35 | 18                                     | 20  | 15                     | 22                        |



# Double row cylindrical roller bearings with cage

## Radial internal clearance

The radial internal clearance of bearings with a cylindrical bore normally corresponds to internal clearance group CN to DIN 620-4.

### Radial internal clearance (cylindrical bore)

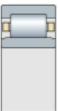
| Bore<br>d<br>mm |       | Radial internal clearance |      |          |      |          |      |
|-----------------|-------|---------------------------|------|----------|------|----------|------|
|                 |       | CN<br>μm                  |      | C3<br>μm |      | C4<br>μm |      |
| over            | incl. | min.                      | max. | min.     | max. | min.     | max. |
| 180             | 200   | 90                        | 145  | 140      | 195  | 195      | 250  |
| 200             | 225   | 105                       | 165  | 160      | 220  | 220      | 280  |
| 225             | 250   | 110                       | 175  | 170      | 235  | 235      | 300  |
| 250             | 280   | 125                       | 195  | 190      | 260  | 260      | 330  |
| 280             | 315   | 130                       | 205  | 200      | 275  | 275      | 350  |
| 315             | 355   | 145                       | 225  | 225      | 305  | 305      | 385  |
| 355             | 400   | 190                       | 280  | 280      | 370  | 370      | 460  |
| 400             | 450   | 210                       | 310  | 310      | 410  | 410      | 510  |
| 450             | 500   | 220                       | 330  | 330      | 440  | 440      | 550  |
| 500             | 560   | 240                       | 360  | 360      | 480  | 480      | 600  |
| 560             | 630   | 260                       | 380  | 380      | 500  | 500      | 620  |
| 630             | 710   | 285                       | 425  | 425      | 565  | 565      | 705  |
| 710             | 800   | 310                       | 470  | 470      | 630  | 630      | 790  |
| 800             | 900   | 350                       | 520  | 520      | 690  | 690      | 860  |
| 900             | 1000  | 390                       | 580  | 580      | 770  | 770      | 960  |
| 1000            | 1120  | 430                       | 640  | 640      | 850  | 850      | 1060 |
| 1120            | 1250  | 470                       | 710  | 710      | 950  | 950      | 1190 |
| 1250            | 1400  | 530                       | 790  | 790      | 1050 | 1050     | 1310 |
| 1400            | 1600  | 610                       | 890  | 890      | 1170 | 1170     | 1450 |

**Radial internal clearance of super precision bearings**

The radial internal clearance of super precision bearings is smaller than the normal internal clearance and corresponds to internal clearance group C1NA for the accuracy SP and UP. The internal clearance is not stated in the designation. The bearing rings are not interchangeable.

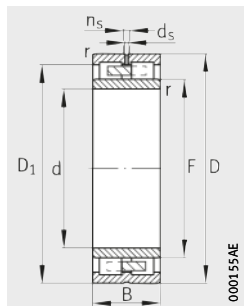
**Radial internal clearance C1NA (tapered bore)**

| Bore<br>d<br>mm |       | Radial internal clearance<br>C1NA<br>μm |      |
|-----------------|-------|---|------|
| over            | incl. | min.                                    | max. |
| 200             | 225   | 60                                      | 95   |
| 225             | 250   | 65                                      | 100  |
| 250             | 280   | 75                                      | 110  |
| 280             | 315   | 80                                      | 120  |
| 315             | 355   | 90                                      | 135  |
| 355             | 400   | 100                                     | 150  |
| 400             | 450   | 110                                     | 170  |
| 450             | 500   | 120                                     | 190  |
| 500             | 560   | 130                                     | 210  |
| 560             | 630   | 140                                     | 230  |
| 630             | 710   | 160                                     | 260  |
| 710             | 800   | 170                                     | 290  |
| 800             | 900   | 190                                     | 330  |
| 900             | 1000  | 210                                     | 360  |
| 1000            | 1120  | 230                                     | 400  |
| 1120            | 1250  | 250                                     | 440  |
| 1250            | 1400  | 270                                     | 460  |
| 1400            | 1600  | 300                                     | 500  |
| 1600            | 1800  | 320                                     | 530  |

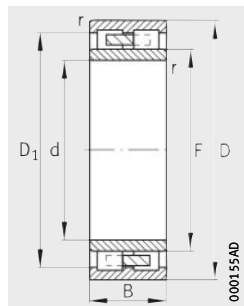


# Cylindrical roller bearings with cage

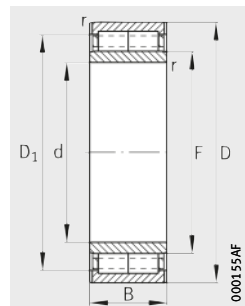
Double row, with cylindrical bore



Design 1



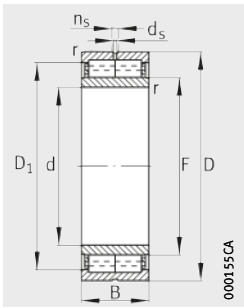
Design 2



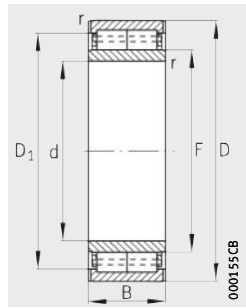
Design 4

Dimension table - Dimensions in mm

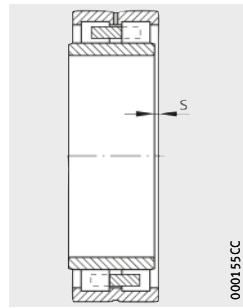
| Designation       | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |      |                 |       |                |
|-------------------|--------|-------------------|------------|-----|-----|------|-----------------|-------|----------------|
|                   |        |                   | d          | D   | B   | r    | ε <sup>1)</sup> | F     | D <sub>1</sub> |
|                   |        |                   |            |     |     | min. |                 |       | ≈              |
| NUU4138-M         | 2      | 42,3              | <b>190</b> | 320 | 128 | 3    | 4               | 222   | 275,3          |
| NUU4140-M         | 2      | 52,2              | <b>200</b> | 340 | 140 | 3    | 4,3             | 235   | 295            |
| NUU4144-M         | 2      | 65,9              | <b>220</b> | 370 | 150 | 4    | 4,9             | 258   | 321,5          |
| NUU4948-S-M-P5-C3 | 1      | 18,2              | <b>240</b> | 320 | 80  | 2,1  | 4,7             | 265   | 292,2          |
| NUU4148-M         | 2      | 80,9              | <b>240</b> | 400 | 160 | 4    | 5,1             | 282   | 352,1          |
| NUU4852-S-M       | 1      | 10,6              | <b>260</b> | 320 | 60  | 2    | 2,5             | 279,5 | 299            |
| NUU4952-S-M-P5-C3 | 1      | 31,9              | <b>260</b> | 360 | 100 | 2,1  | 4               | 292   | 325,6          |
| NUU4052-S-M       | 1      | 65,5              | <b>260</b> | 400 | 140 | 4    | 4,5             | 298   | 354,9          |
| NUU4152-M         | 2      | 115               | <b>260</b> | 440 | 180 | 4    | 7,7             | 306   | 381,2          |
| NUU4856-S-M       | 1      | 15,4              | <b>280</b> | 350 | 69  | 2    | 2,5             | 302   | 326,6          |
| NUU4956-S-M-P5-C3 | 1      | 33,7              | <b>280</b> | 380 | 100 | 2,1  | 4               | 312   | 345,6          |
| NUU4156-M         | 2      | 121               | <b>280</b> | 460 | 180 | 5    | 5               | 326   | 401,2          |
| NUU4860-S-M       | 1      | 22                | <b>300</b> | 380 | 80  | 2,1  | 3,4             | 325   | 353,2          |
| NUU4960-S-M-P5-C3 | 1      | 52,3              | <b>300</b> | 420 | 118 | 3    | 5               | 339   | 379            |
| NUU4160-M         | 2      | 161               | <b>300</b> | 500 | 200 | 5    | 9,2             | 351   | 434,6          |
| NUU4864-S-M       | 1      | 23,2              | <b>320</b> | 400 | 80  | 2,1  | 3,4             | 346   | 373,2          |
| NUU4964-S-M-P5-C3 | 1      | 55,2              | <b>320</b> | 440 | 118 | 3    | 8,1             | 359   | 399            |
| Z-525271.ZL       | 4      | 68,6              | <b>320</b> | 460 | 120 | 4    | 7               | 364   | 413,9          |
| NUU4164-M         | 2      | 208               | <b>320</b> | 540 | 218 | 5    | 9,5             | 375   | 465,1          |
| NUU4868-S-M       | 1      | 25                | <b>340</b> | 420 | 80  | 2,1  | 5,5             | 366   | 393,2          |
| NUU4968-S-M-P5-C3 | 1      | 58                | <b>340</b> | 460 | 118 | 3    | 6,4             | 379   | 419            |
| NUU4068-S-M       | 1      | 140               | <b>340</b> | 520 | 180 | 5    | 8,4             | 385   | 460            |
| NUU4168-M         | 2      | 268               | <b>340</b> | 580 | 243 | 5    | 10,3            | 402   | 502,5          |
| NUU4872-S-M       | 1      | 25,8              | <b>360</b> | 440 | 80  | 2,1  | 3,4             | 386   | 414,1          |
| Z-527930.ZL       | 6      | 41,9              | <b>360</b> | 460 | 100 | 3    | 8,8             | 384,7 | 426,6          |
| NUU4972-S-M-C3    | 1      | 60,8              | <b>360</b> | 480 | 118 | 3    | 5               | 399   | 439            |
| Z-529482.ZL       | 6      | 78,7              | <b>360</b> | 500 | 125 | 5    | -               | 394   | 454            |
| NUU4172-M         | 2      | 281               | <b>360</b> | 600 | 243 | 5    | 10,2            | 422   | 523            |
| NUU4876-S-M       | 1      | 44                | <b>380</b> | 480 | 100 | 2,1  | 6,8             | 412   | 445,6          |
| NUU4976-S-M-C3    | 1      | 91,5              | <b>380</b> | 520 | 140 | 4    | 7,5             | 426   | 470            |
| Z-556618.ZL       | 5      | 114               | <b>380</b> | 540 | 150 | 3    | 8,7             | 422   | 485,4          |
| Z-507768.ZL       | 4      | 135               | <b>380</b> | 540 | 180 | 4    | 8               | 420   | 490,4          |
| NUU4176-M         | 2      | 293               | <b>380</b> | 620 | 243 | 5    | 10,3            | 442   | 542,5          |



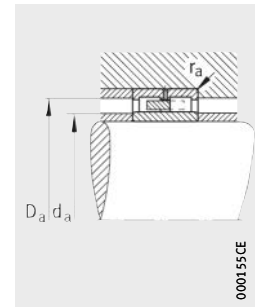
Design 5  
With pin cage



Design 6  
With pin cage

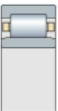


1) Axial displacement "s"



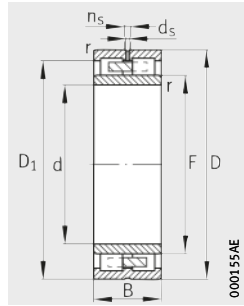
Mounting dimensions

| ds  | ns   | Mounting dimensions |            |            | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ur</sub><br>kN | Limiting speed<br>n <sub>G</sub><br>min <sup>-1</sup> |
|-----|------|---------------------|------------|------------|------------------------------|--------------------------------|---|---|
|     |      | da<br>min.          | Da<br>max. | ra<br>max. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |   |   |
| -   | -    | 204                 | 306        | 2,5        | 1 200                        | 2 120                          | 237   | 2 400   |
| -   | -    | 214                 | 326        | 2,5        | 1 430                        | 2 500                          | 275   | 2 200   |
| -   | -    | 237                 | 353        | 3          | 1 630                        | 2 900                          | 315   | 1 900   |
| 6,3 | 12,2 | 250                 | 310        | 2          | 530                          | 1 200                          | 127   | 2 000   |
| -   | -    | 257                 | 383        | 3          | 1 960                        | 3 600                          | 380   | 1 800   |
| 4,8 | 9,5  | 269                 | 311        | 2          | 375                          | 1 020                          | 107   | 1 900   |
| 8   | 15   | 270                 | 350        | 2          | 750                          | 1 700                          | 173   | 1 800   |
| 6,3 | 12,2 | 275                 | 385        | 3          | 1 660                        | 3 450                          | 365   | 1 700   |
| -   | -    | 277                 | 423        | 3          | 2 360                        | 4 400                          | 450   | 1 700   |
| 4,8 | 9,5  | 289                 | 341        | 2          | 520                          | 1 370                          | 138   | 1 800   |
| 8   | 15   | 290                 | 370        | 2          | 765                          | 1 800                          | 181   | 1 700   |
| -   | -    | 300                 | 440        | 4          | 2 400                        | 4 650                          | 470   | 1 600   |
| 4,8 | 9,5  | 310                 | 370        | 2          | 630                          | 1 630                          | 162   | 1 700   |
| 9,5 | 17,7 | 312                 | 408        | 2,5        | 1 040                        | 2 400                          | 243   | 1 600   |
| -   | -    | 320                 | 480        | 4          | 2 900                        | 5 700                          | 570   | 1 500   |
| 4,8 | 9,5  | 330                 | 390        | 2          | 640                          | 1 700                          | 166   | 1 600   |
| 9,5 | 17,7 | 332                 | 428        | 2,5        | 1 060                        | 2 550                          | 255   | 1 600   |
| -   | -    | -                   | -          | 3          | 1 530                        | 3 550                          | 350   | 1 500   |
| -   | -    | 340                 | 520        | 4          | 3 350                        | 6 550                          | 640   | 1 400   |
| 4,8 | 9,5  | 350                 | 410        | 2          | 655                          | 1 800                          | 173   | 1 600   |
| 9,5 | 17,7 | 352                 | 448        | 2,5        | 1 100                        | 2 650                          | 265   | 1 500   |
| 8   | 19   | 357                 | 503        | 4          | 2 600                        | 5 400                          | 520   | 1 400   |
| -   | -    | 360                 | 560        | 4          | 4 000                        | 7 800                          | 740   | 1 300   |
| -   | -    | 370                 | 430        | 2          | 670                          | 1 900                          | 180   | 1 500   |
| -   | -    | -                   | -          | 2,5        | 1 290                        | 3 350                          | 330   | 1 500   |
| 9,5 | 17,7 | 372                 | 468        | 2,5        | 1 140                        | 2 800                          | 275   | 1 400   |
| -   | -    | -                   | -          | 4          | 2 040                        | 4 650                          | 440   | 1 400   |
| -   | -    | 380                 | 580        | 4          | 4 050                        | 8 150                          | 780   | 1 200   |
| 6,3 | 12,2 | 390                 | 470        | 2,1        | 965                          | 2 600                          | 244   | 1 400   |
| 9,5 | 17,7 | 395                 | -          | 3          | 1 430                        | 3 600                          | 340   | 1 300   |
| -   | -    | -                   | -          | 2,5        | 2 550                        | 6 000                          | 580   | 1 300   |
| -   | -    | -                   | -          | 3          | 2 800                        | 6 400                          | 620   | 1 300   |
| -   | -    | 400                 | 600        | 4          | 4 250                        | 8 650                          | 810   | 1 200   |

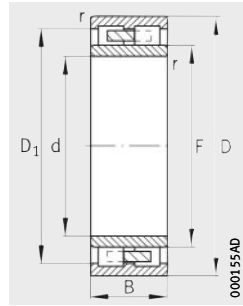


# Cylindrical roller bearings with cage

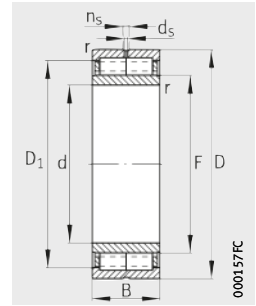
Double row, with cylindrical bore



Design 1



Design 2

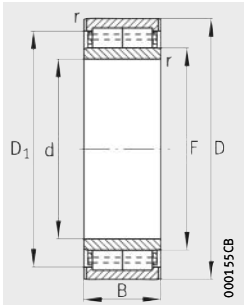


Design 3

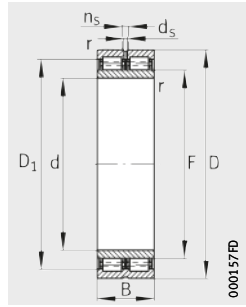
Dimension table (continued) · Dimensions in mm

| Designation             | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |      |                 |       |                |
|-------------------------|--------|-------------------|------------|-----|-----|------|-----------------|-------|----------------|
|                         |        |                   | d          | D   | B   | r    | ε <sup>1)</sup> | F     | D <sub>1</sub> |
|                         |        |                   |            |     |     | min. |                 |       | ≈              |
| <b>NUU4980-S-M-C3</b>   | 1      | 95,2              | <b>400</b> | 540 | 140 | 4    | 5,5             | 446   | 490,8          |
| <b>NUU4080-S-M</b>      | 1      | 199               | <b>400</b> | 600 | 200 | 5    | 9,5             | 450   | 534            |
| <b>Z-526089.ZL</b>      | 7      | 343               | <b>400</b> | 640 | 260 | 5    | –               | 461   | 568            |
| <b>NUU4180-M</b>        | 2      | 324               | <b>400</b> | 650 | 250 | 6    | 11,4            | 463   | 577            |
| <b>NUU4884-S-M</b>      | 1      | 48,4              | <b>420</b> | 520 | 100 | 2,1  | 6,2             | 453   | 486,6          |
| <b>NUU4984-S-M-C3</b>   | 1      | 99,2              | <b>420</b> | 560 | 140 | 4    | 8,3             | 466   | 510,8          |
| <b>Z-539553.ZL</b>      | 6      | 108               | <b>420</b> | 580 | 130 | 4    | 7               | 460   | 526,8          |
| <b>Z-533053.ZL</b>      | 1      | 128               | <b>420</b> | 580 | 160 | 4    | 5,9             | 463   | 530            |
| <b>NUU4184-M</b>        | 2      | 434               | <b>420</b> | 700 | 280 | 6    | 8,7             | 491   | 612            |
| <b>NUU4888-S-M</b>      | 1      | 50,2              | <b>440</b> | 540 | 100 | 2,1  | 3,8             | 473   | 506,6          |
| <b>Z-528620.ZL</b>      | 6      | 81,4              | <b>440</b> | 570 | 120 | 3    | 9               | 473   | 526,4          |
| <b>NUU4988-S-M-C3</b>   | 1      | 137               | <b>440</b> | 600 | 160 | 4    | 5,8             | 490   | 544,4          |
| <b>NUU4088-S-M</b>      | 1      | 243               | <b>440</b> | 650 | 212 | 6    | 8               | 491   | 581            |
| <b>NUU4188-M</b>        | 2      | 453               | <b>440</b> | 720 | 280 | 6    | 12,9            | 511   | 632            |
| <b>Z-524628.ZL</b>      | 6      | 58,3              | <b>460</b> | 570 | 105 | 3    | 6,3             | 486,7 | 533,6          |
| <b>NUU4892-S-M</b>      | 1      | 75,1              | <b>460</b> | 580 | 118 | 3    | 4,9             | 499   | 539            |
| <b>NUU4992-S-M-C3</b>   | 1      | 141               | <b>460</b> | 620 | 160 | 4    | 5,8             | 510   | 564,4          |
| <b>NUU4092-S-M</b>      | 1      | 275               | <b>460</b> | 680 | 218 | 6    | 9,5             | 516   | 606            |
| <b>NUU4192-M</b>        | 2      | 550               | <b>460</b> | 760 | 300 | 7,5  | 8,7             | 537   | 663            |
| <b>NUU4896-S-M</b>      | 1      | 77,7              | <b>480</b> | 600 | 118 | 3    | 4,9             | 519   | 559            |
| <b>NUU4996-S-M-C3</b>   | 1      | 154               | <b>480</b> | 650 | 170 | 5    | 6               | 534   | 593            |
| <b>NUU4096-S-M</b>      | 1      | 282               | <b>480</b> | 700 | 218 | 6    | 9,5             | 538   | 631,5          |
| <b>NUU4196-M</b>        | 2      | 602               | <b>480</b> | 790 | 308 | 7,5  | 13              | 557   | 691,5          |
| <b>NUU48/500-S-M</b>    | 1      | 75,7              | <b>500</b> | 620 | 118 | 3    | 4,7             | 539   | 580,5          |
| <b>Z-523745.ZL</b>      | 6      | 81,7              | <b>500</b> | 620 | 120 | 4    | 10              | 532   | 582            |
| <b>NUU49/500-S-M-C3</b> | 1      | 159               | <b>500</b> | 670 | 170 | 5    | 6               | 554   | 613            |
| <b>NUU40/500-S-M</b>    | 1      | 295               | <b>500</b> | 720 | 218 | 6    | 9,5             | 558   | 651,5          |
| <b>Z-509393.ZL</b>      | 3      | 312               | <b>500</b> | 720 | 218 | 6    | 9,5             | 558   | 647,6          |
| <b>NUU41/500-M</b>      | 2      | 706               | <b>500</b> | 830 | 325 | 7,5  | 11,7            | 582   | 725            |
| <b>NUU49/530-S-M-C3</b> | 1      | 206               | <b>530</b> | 710 | 180 | 5    | 7,2             | 588   | 655            |
| <b>NUU40/530-S-M</b>    | 1      | 407               | <b>530</b> | 780 | 250 | 6    | 11,8            | 591   | 698            |
| <b>NUU41/530-M</b>      | 2      | 796               | <b>530</b> | 870 | 335 | 7,5  | 16,2            | 618   | 761            |
| <b>Z-549875.ZL</b>      | 1      | 452               | <b>550</b> | 800 | 260 | 6    | –               | 612   | 721            |
| <b>Z-522739.ZL</b>      | 6      | 91                | <b>560</b> | 680 | 120 | 5    | 8,5             | 592   | 642            |
| <b>NUU49/560-S-M-C3</b> | 1      | 246               | <b>560</b> | 750 | 190 | 5    | 5,8             | 617   | 684            |
| <b>NUU40/560-S-M</b>    | 1      | 461               | <b>560</b> | 820 | 258 | 6    | 13,8            | 630   | 737            |
| <b>NUU41/560-M</b>      | 2      | 952               | <b>560</b> | 920 | 355 | 7,5  | 15,8            | 653   | 804            |

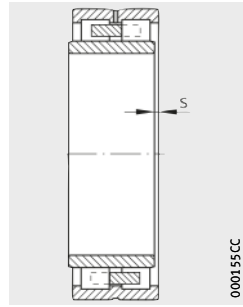




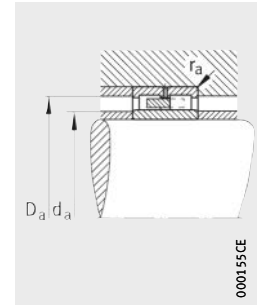
Design 6  
With pin cage



Design 7  
With pin cage

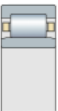


1) Axial displacement "s"



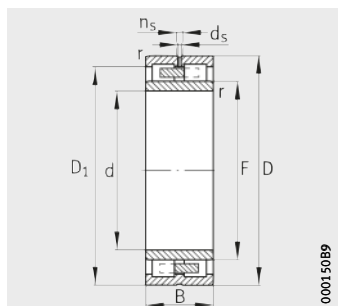
Mounting dimensions

| $d_s$ | $n_s$ | Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load | Limiting speed             |
|-------|-------|---------------------|---------------|---------------|---------------------|-------------------------|--------------------|----------------------------|
|       |       | $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | $C_{ur}$<br>kN     | $n_G$<br>$\text{min}^{-1}$ |
| 9,5   | 17,7  | 415                 | 525           | 3             | 1 500               | 3 800                   | 355                | 1 300                      |
| 9,5   | 17,7  | 417                 | 583           | 4             | 3 200               | 6 950                   | 650                | 1 200                      |
| 9,5   | 17,7  | –                   | –             | 4             | 5 300               | 11 200                  | 1 040              | 1 100                      |
| –     | –     | 426                 | 624           | 5             | 4 800               | 9 500                   | 860                | 1 100                      |
| 8     | 15    | 430                 | 510           | 2             | 1 000               | 2 850                   | 260                | 1 300                      |
| 9,5   | 17,7  | 435                 | 545           | 3             | 1 530               | 4 000                   | 370                | 1 200                      |
| –     | –     | –                   | –             | 3             | 2 400               | 5 600                   | 520                | 1 200                      |
| 6,3   | 12,2  | –                   | –             | 3             | 2 280               | 5 200                   | 485                | 1 100                      |
| –     | –     | 446                 | 674           | 5             | 5 500               | 11 000                  | 970                | 1 000                      |
| 8     | 15    | 450                 | 530           | 2             | 1 040               | 3 000                   | 270                | 1 200                      |
| –     | –     | –                   | –             | 2,5           | 1 960               | 5 100                   | 470                | 1 100                      |
| 9,5   | 17,7  | 455                 | 585           | 3             | 2 040               | 5 200                   | 480                | 1 100                      |
| 9,5   | 21,7  | 463                 | 627           | 5             | 3 800               | 8 300                   | 770                | 1 000                      |
| –     | –     | 466                 | 694           | 5             | 5 600               | 11 600                  | 1 010              | 950                        |
| –     | –     | –                   | –             | 2,5           | 1 630               | 4 400                   | 400                | 1 100                      |
| 8     | 15    | 472                 | 568           | 2,5           | 1 320               | 3 650                   | 340                | 1 100                      |
| 9,5   | 17,7  | 475                 | 605           | 3             | 2 120               | 5 500                   | 500                | 1 000                      |
| 9,5   | 21,7  | –                   | –             | 5             | 3 900               | 8 800                   | 790                | 950                        |
| –     | –     | 492                 | 728           | 6             | 6 400               | 13 200                  | 1 160              | 900                        |
| 8     | 15    | 492                 | 588           | 2,5           | 1 340               | 3 800                   | 345                | 1 000                      |
| 9,5   | 17,7  | 497                 | 633           | 4             | 2 360               | 6 100                   | 550                | 950                        |
| 9,5   | 21,7  | 503                 | 677           | 5             | 4 150               | 9 300                   | 840                | 950                        |
| –     | –     | 512                 | 758           | 6             | 6 550               | 13 400                  | 1 140              | 850                        |
| 8     | 15    | 512                 | 608           | 2,5           | 1 400               | 4 150                   | 370                | 1 000                      |
| –     | –     | –                   | –             | 3             | 1 960               | 5 600                   | 495                | 1 000                      |
| 9,5   | 17,7  | 517                 | 653           | 4             | 2 320               | 6 100                   | 540                | 950                        |
| 9,5   | 21,7  | 523                 | 697           | 5             | 4 250               | 9 650                   | 860                | 900                        |
| 8     | 15    | –                   | –             | 5             | 4 650               | 11 000                  | 980                | 900                        |
| –     | –     | 532                 | 798           | 6             | 7 200               | 14 600                  | 1 250              | 850                        |
| 9,5   | 17,7  | 547                 | 693           | 4             | 2 900               | 7 650                   | 670                | 900                        |
| 9,5   | 21,7  | 553                 | 757           | 5             | 5 100               | 11 600                  | 1 000              | 850                        |
| –     | –     | 562                 | 838           | 6             | 7 650               | 16 300                  | 1 370              | 800                        |
| 12,5  | 23,5  | –                   | –             | 5             | 6 100               | 14 600                  | 1 220              | 800                        |
| –     | –     | –                   | –             | 4             | 2 080               | 6 300                   | 540                | 900                        |
| 9,5   | 17,7  | 577                 | 733           | 4             | 3 150               | 8 800                   | 760                | 850                        |
| 9,5   | 21,7  | 583                 | 797           | 5             | 5 200               | 12 000                  | 1 030              | 800                        |
| –     | –     | 592                 | 888           | 6             | 8 800               | 19 000                  | 1 550              | 750                        |

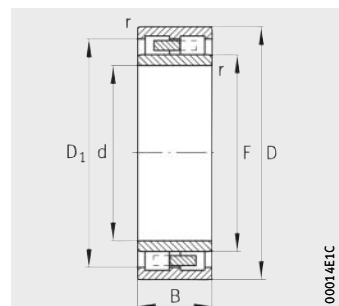


# Cylindrical roller bearings with cage

Double row, with cylindrical bore



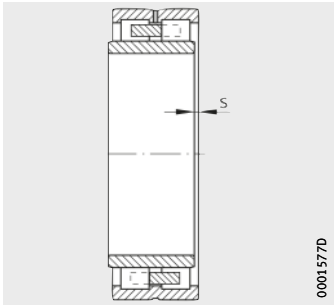
Design 1



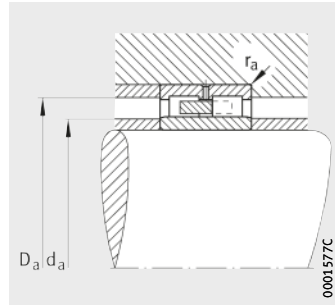
Design 2

Dimension table (continued) · Dimensions in mm

| Designation       | Design | Mass<br>m<br>≈ kg | Dimensions |       |     |      |                 |       |                |
|-------------------|--------|-------------------|------------|-------|-----|------|-----------------|-------|----------------|
|                   |        |                   | d          | D     | B   | r    | s <sup>1)</sup> | F     | D <sub>1</sub> |
|                   |        |                   |            |       |     | min. |                 |       | ≈              |
| NUU49/600-S-M-C3  | 1      | 287               | 600        | 800   | 200 | 5    | 6,3             | 666   | 741            |
| NUU40/600-S-M     | 1      | 533               | 600        | 870   | 272 | 6    | 12              | 668   | 787,5          |
| NUU41/600-M       | 2      | 1 120             | 600        | 980   | 375 | 7,5  | 18              | 699   | 858,5          |
| NUU48/630-S-M     | 1      | 164               | 630        | 780   | 150 | 4    | 8,8             | 678   | 726            |
| NUU49/630-S-M-C3  | 1      | 362               | 630        | 850   | 218 | 6    | 8,6             | 704   | 784,5          |
| NUU41/630-M       | 2      | 1 320             | 630        | 1 030 | 400 | 7,5  | 11,7            | 734   | 902            |
| Z-509944.ZL       | 2      | 388               | 660        | 880   | 225 | 6    | 10              | 727   | 807,3          |
| NUU49/670-S-M-C3  | 1      | 421               | 670        | 900   | 230 | 6    | 7               | 738   | 828,5          |
| NUU41/670-M       | 2      | 1 530             | 670        | 1 090 | 412 | 7,5  | 18,2            | 774   | 950,5          |
| NUU49/710-S-M-C3  | 1      | 488               | 710        | 950   | 243 | 6    | 7,9             | 782   | 875,5          |
| NUU41/710-M       | 2      | 1 790             | 710        | 1 150 | 438 | 9,5  | 20              | 820   | 1 005          |
| NUU49/750-S-M-C3  | 1      | 563               | 750        | 1 000 | 250 | 6    | 7,5             | 825   | 918,8          |
| NUU41/750-M       | 2      | 2 190             | 750        | 1 220 | 475 | 9,5  | 21,3            | 871   | 1 073          |
| NUU48/800-S-M     | 1      | 279               | 800        | 980   | 180 | 5    | 5,9             | 856   | 919,5          |
| NUU49/800-S-M-C3  | 1      | 635               | 800        | 1 060 | 258 | 6    | 10,2            | 880   | 980,8          |
| NUU41/800-M       | 2      | 2 390             | 800        | 1 280 | 475 | 9,5  | 12,5            | 921   | 1 123          |
| NUU48/850-S-M     | 1      | 292               | 850        | 1 030 | 180 | 5    | 5,9             | 910   | 971            |
| NUU49/850-S-M-C3  | 1      | 722               | 850        | 1 120 | 272 | 6    | 9,5             | 931   | 1 031,8        |
| NUU41/850-M       | 2      | 2 810             | 850        | 1 360 | 500 | 12   | 12,9            | 976   | 1 194          |
| NUU49/900-S-M-C3  | 1      | 824               | 900        | 1 180 | 280 | 6    | 11,8            | 986   | 1 093          |
| NUU41/900-M       | 2      | 3 100             | 900        | 1 420 | 515 | 12   | 23              | 1 032 | 1 250          |
| NUU48/950-S-M     | 1      | 430               | 950        | 1 150 | 200 | 5    | 6,3             | 1 016 | 1 086          |
| NUU49/950-S-M-C3  | 1      | 938               | 950        | 1 250 | 300 | 7,5  | 9,3             | 1 046 | 1 160          |
| NUU41/950-M       | 2      | 3 660             | 950        | 1 500 | 545 | 12   | 14              | 1 092 | 1 327          |
| NUU49/1000-S-M-C3 | 1      | 1 200             | 1 000      | 1 320 | 315 | 7,5  | 12,8            | 1 103 | 1 224          |
| NUU41/1000-M      | 2      | 4 340             | 1 000      | 1 580 | 580 | 12   | 14,1            | 1 154 | 1 406          |
| NUU49/1060-S-M-C3 | 1      | 1 410             | 1 060      | 1 400 | 335 | 7,5  | 17,5            | 1 160 | 1 294          |
| NUU41/1060-M      | 2      | 4 930             | 1 060      | 1 660 | 600 | 15   | 15              | 1 214 | 1 466          |
| NUU49/1120-S-M-C3 | 1      | 1 460             | 1 120      | 1 460 | 335 | 7,5  | 10,5            | 1 220 | 1 354          |
| NUU41/1120-M      | 2      | 5 750             | 1 120      | 1 750 | 630 | 15   | 15,9            | 1 279 | 1 548          |
| NUU48/1180-S-M    | 1      | 783               | 1 180      | 1 420 | 243 | 6    | 14,8            | 1 264 | 1 341          |
| NUU49/1180-S-M-C3 | 1      | 1 750             | 1 180      | 1 540 | 355 | 7,5  | 10              | 1 285 | 1 427,5        |
| NUU41/1180-M      | 2      | 6 880             | 1 180      | 1 850 | 670 | 15   | 16,5            | 1 350 | 1 636          |
| NUU49/1250-S-M-C3 | 1      | 2 070             | 1 250      | 1 630 | 375 | 9,5  | 9,5             | 1 360 | 1 511          |
| NUU41/1250-M      | 2      | 8 000             | 1 250      | 1 950 | 710 | 15   | 17,4            | 1 426 | 1 720          |
| NUU49/1320-S-M-C3 | 1      | 2 520             | 1 320      | 1 720 | 400 | 7,5  | 10              | 1 430 | 1 581          |
| NUU49/1600-S-M-C3 | 1      | 3 950             | 1 600      | 2 060 | 462 | 9,5  | 12              | 1 740 | 1 908          |

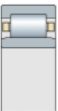


1) Axial displacement "s"



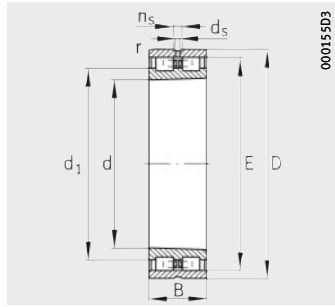
Mounting dimensions

| d <sub>s</sub> | n <sub>s</sub> | Mounting dimensions    |                        |                        | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ur</sub><br>kN | Limiting speed<br>n <sub>G</sub><br>min <sup>-1</sup> |
|----------------|----------------|------------------------|------------------------|------------------------|------------------------------|--------------------------------|---|---|
|                |                | d <sub>a</sub><br>min. | D <sub>a</sub><br>max. | r <sub>a</sub><br>max. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |   |   |
| 9,5            | 17,7           | 617                    | 783                    | 4                      | 3 750                        | 10 400                         | 860   | 750   |
| 12,5           | 27,5           | 623                    | 847                    | 5                      | 6 300                        | 14 600                         | 1 200                                       | 750   |
| –              | –              | 632                    | 948                    | 6                      | 9 650                        | 20 800                         | 1 680                                       | 670   |
| 9,5            | 17,7           | 645                    | 765                    | 3                      | 2 240                        | 7 100                          | 590   | 750   |
| 12,5           | 23,5           | 653                    | 827                    | 5                      | 4 150                        | 11 400                         | 940   | 700   |
| –              | –              | 692                    | 998                    | 6                      | 10 800                       | 23 600                         | 1 860                                       | 670   |
| –              | –              | –                      | –                      | 5                      | 4 250                        | 11 800                         | 960   | 700   |
| 12,5           | 23,5           | 693                    | 877                    | 5                      | 5 000                        | 13 400                         | 1 110                                       | 700   |
| –              | –              | 702                    | 1 058                  | 6                      | 11 600                       | 25 500                         | 1 990                                       | 600   |
| 12,5           | 23,5           | 733                    | 927                    | 5                      | 5 500                        | 15 000                         | 1 240                                       | 630   |
| –              | –              | 750                    | 1 110                  | 8                      | 12 900                       | 28 500                         | 2 210                                       | 560   |
| 12,5           | 23,5           | 773                    | 977                    | 5                      | 5 850                        | 16 600                         | 1 330                                       | 600   |
| –              | –              | 790                    | 1 180                  | 8                      | 15 300                       | 34 500                         | 2 550                                       | 530   |
| 9,5            | 17,7           | 817                    | 963                    | 4                      | 3 450                        | 11 400                         | 900   | 600   |
| 12,5           | 23,5           | 823                    | 1 037                  | 5                      | 6 100                        | 17 300                         | 1 350                                       | 560   |
| –              | –              | 840                    | 1 240                  | 8                      | 15 600                       | 36 000                         | 2 650                                       | 500   |
| 9,5            | 17,7           | 867                    | 1 013                  | 4                      | 3 550                        | 12 000                         | 930   | 560   |
| 12,5           | 23,5           | 873                    | 1 097                  | 5                      | 6 300                        | 18 000                         | 1 400                                       | 530   |
| –              | –              | 898                    | 1 312                  | 10                     | 17 300                       | 39 000                         | 2 850                                       | 480   |
| 12,5           | 23,5           | 923                    | 1 157                  | 5                      | 7 100                        | 20 400                         | 1 550                                       | 500   |
| –              | –              | 948                    | 1 372                  | 10                     | 18 000                       | 42 500                         | 3 050                                       | 450   |
| 9,5            | 17,7           | 967                    | 1 133                  | 4                      | 4 500                        | 15 600                         | 1 170                                       | 500   |
| 12,5           | 23,5           | 978                    | 1 222                  | 6                      | 8 150                        | 24 000                         | 1 770                                       | 480   |
| –              | –              | 998                    | 1 452                  | 10                     | 20 400                       | 48 000                         | 3 400                                       | 430   |
| 12,5           | 23,5           | 1 028                  | 1 292                  | 6                      | 9 000                        | 26 500                         | 1 930                                       | 450   |
| –              | –              | 1 048                  | 1 532                  | 10                     | 23 600                       | 56 000                         | 3 850                                       | 400   |
| 12,5           | 23,5           | 1 088                  | 1 372                  | 6                      | 10 400                       | 30 000                         | 2 120                                       | 430   |
| –              | –              | 1 118                  | 1 602                  | 12                     | 24 500                       | 60 000                         | 4 100                                       | 400   |
| 12,5           | 23,5           | 1 148                  | 1 432                  | 6                      | 10 400                       | 31 000                         | 2 150                                       | 400   |
| –              | –              | 1 178                  | 1 692                  | 12                     | 27 500                       | 67 000                         | 4 500                                       | 380   |
| 12,5           | 23,5           | 1 203                  | 1 397                  | 5                      | 6 000                        | 22 000                         | 1 540                                       | 400   |
| 12,5           | 23,5           | 1 208                  | 1 512                  | 6                      | 12 200                       | 37 500                         | 2 550                                       | 380   |
| –              | –              | 1 238                  | 1 792                  | 12                     | 30 500                       | 76 500                         | 5 000                                       | 360   |
| 12,5           | 23,5           | 1 284                  | 1 596                  | 8                      | 13 700                       | 41 500                         | 2 850                                       | 380   |
| –              | –              | 1 308                  | 1 892                  | 12                     | 33 500                       | 83 000                         | 5 500                                       | 340   |
| 12,5           | 23,5           | 1 348                  | 1 692                  | 6                      | 14 600                       | 46 500                         | 3 150                                       | 360   |
| 12,5           | 23,5           | 1 634                  | 2 026                  | 8                      | 18 300                       | 61 000                         | 3 850                                       | 300   |

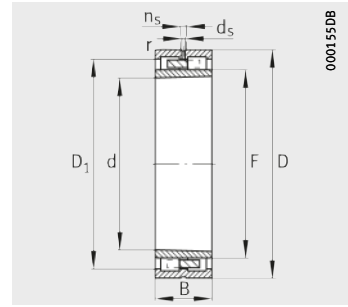


# Super precision cylindrical roller bearings

Double row, with tapered bore (taper 1:12)



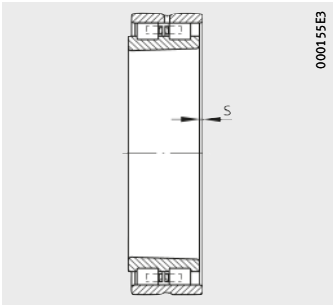
NN30...-AS-K-M-SP



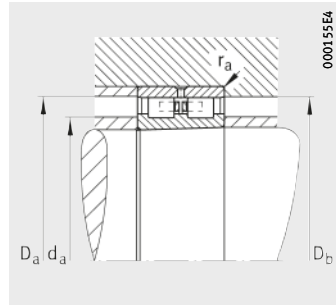
NNU49...-S-K-M-SP

**Dimension table** - Dimensions in mm

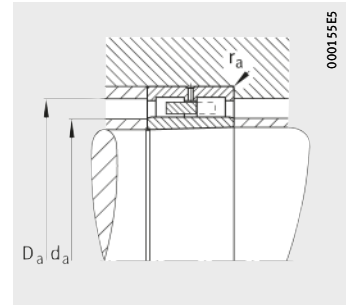
| Designation        | Mass<br>m<br>≈kg | Dimensions |     |     |      |                 |     |     |                |                |
|--------------------|------------------|------------|-----|-----|------|-----------------|-----|-----|----------------|----------------|
|                    |                  | d          | D   | B   | r    | s <sup>1)</sup> | E   | F   | D <sub>1</sub> | d <sub>1</sub> |
|                    |                  |            |     |     | min. |                 |     |     | ≈              | ≈              |
| NN3044-AS-K-M-SP   | 29,1             | 220        | 340 | 90  | 3    | 4,5             | 310 | –   | –              | 265,2          |
| NNU4948-S-K-M-SP   | 17,1             | 240        | 320 | 80  | 2,1  | 3,4             | –   | 265 | 292,2          | –              |
| NN3048-AS-K-M-SP   | 31,5             | 240        | 360 | 92  | 3    | 6               | 330 | –   | –              | 285,2          |
| NNU4952-S-K-M-SP   | 30,5             | 260        | 360 | 100 | 2,1  | 4               | –   | 292 | 325,6          | –              |
| NN3052-AS-K-M-SP   | 46,2             | 260        | 400 | 104 | 4    | 6,5             | 364 | –   | –              | 312,8          |
| NNU4956-S-K-M-SP   | 32,3             | 280        | 380 | 100 | 2,1  | 4               | –   | 312 | 345,6          | –              |
| NN3056-AS-K-M-SP   | 49,7             | 280        | 420 | 106 | 4    | 6,8             | 384 | –   | –              | 332,8          |
| NNU4960-S-K-M-SP   | 50,2             | 300        | 420 | 118 | 4    | 5               | –   | 339 | 379            | –              |
| NN3060-AS-K-M-SP   | 68,5             | 300        | 460 | 118 | 4    | 7,5             | 418 | –   | –              | 360,4          |
| NNU4964-S-K-M-SP   | 55,2             | 320        | 440 | 118 | 3    | 8,1             | –   | 359 | 399            | –              |
| NN3064-AS-K-M-SP   | 73,8             | 320        | 480 | 121 | 4    | 7,9             | 438 | –   | –              | 380,4          |
| NNU4968-S-K-M-SP   | 55,6             | 340        | 460 | 118 | 3    | 5               | –   | 379 | 419            | –              |
| NN3068-AS-K-M-SP   | 99,3             | 340        | 520 | 133 | 5    | 8,7             | 473 | –   | –              | 409            |
| NNU4972-S-K-M-SP   | 57,3             | 360        | 480 | 118 | 3    | 5               | –   | 399 | 439            | –              |
| NN3072-AS-K-M-SP   | 104              | 360        | 540 | 134 | 5    | 8,7             | 493 | –   | –              | 429            |
| NNU4976-S-K-M-SP   | 85,8             | 380        | 520 | 140 | 4    | 5,5             | –   | 426 | 470            | –              |
| NN3076-AS-K-M-SP   | 110              | 380        | 560 | 135 | 5    | 9               | 513 | –   | –              | 449            |
| NNU4980-S-K-M-SP   | 91               | 400        | 540 | 140 | 4    | 5,5             | –   | 446 | 490,8          | –              |
| NN3080-AS-K-M-SP   | 143              | 400        | 600 | 148 | 5    | 9,5             | 549 | –   | –              | 477            |
| NNU4984-S-K-M-SP   | 94,1             | 420        | 560 | 140 | 4    | 5,5             | –   | 466 | 510,8          | –              |
| NN3084-AS-K-M-SP   | 150              | 420        | 620 | 150 | 5    | 10              | 569 | –   | –              | 497            |
| NNU4988-S-K-M-SP   | 131              | 440        | 600 | 160 | 4    | 5,8             | –   | 490 | 544,4          | –              |
| NN3088-AS-K-M-SP   | 172              | 440        | 650 | 157 | 6    | 10,3            | 597 | –   | –              | 520,2          |
| NNU4992-S-K-M-SP   | 134              | 460        | 620 | 160 | 4    | 5,8             | –   | 510 | 564,4          | –              |
| NN3092-AS-K-M-SP   | 197              | 460        | 680 | 163 | 6    | 10,5            | 624 | –   | –              | 544            |
| NNU4996-S-K-M-SP   | 158              | 480        | 650 | 170 | 5    | 6               | –   | 534 | 593            | –              |
| NN3096-AS-K-M-SP   | 208              | 480        | 700 | 165 | 6    | 11              | 644 | –   | –              | 564            |
| NNU49/500-S-K-M-SP | 162              | 500        | 670 | 170 | 5    | 6               | –   | 554 | 613            | –              |
| NN30/500-AS-K-M-SP | 214              | 500        | 720 | 167 | 6    | 11,5            | 664 | –   | –              | 584            |
| NNU49/530-S-K-M-SP | 193              | 530        | 710 | 180 | 5    | 5,8             | –   | 588 | 655            | –              |
| NN30/530-AS-K-M-SP | 289              | 530        | 780 | 185 | 6    | 11,3            | 715 | –   | –              | 617,5          |
| NNU49/560-S-K-M-SP | 235              | 560        | 750 | 190 | 5    | 5,8             | –   | 617 | 684            | –              |
| NN30/560-AS-K-M-SP | 331              | 560        | 820 | 195 | 6    | 11,6            | 756 | –   | –              | 652            |



1) Axial displacement "s"  
for NN30 and NNU49

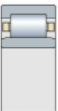


Mounting dimensions  
for NN30



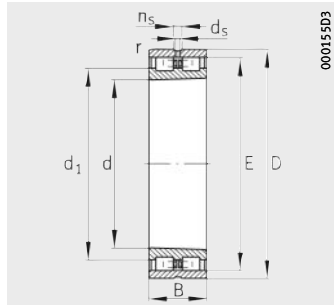
Mounting dimensions  
for NNU49

|       |       | Mounting dimensions |               |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speeds                   |                                |
|-------|-------|---------------------|---------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-----------------------------------|--------------------------------|
| $d_s$ | $n_s$ | $d_a$<br>min.       | $D_a$<br>max. | $D_b$<br>min. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{Or}$<br>kN |                                      | $n_G$ grease<br>$\text{min}^{-1}$ | $n_G$ Oil<br>$\text{min}^{-1}$ |
| 8     | 15    | 232                 | 328           | 313           | 2,5           | 800                 | 1 460                   | 150                                  | 2 200                             | 2 800                          |
| 6,3   | 12,2  | 250                 | 310           | –             | 2             | 530                 | 1 200                   | 127                                  | 2 200                             | 2 800                          |
| 8     | 15    | 252                 | 348           | 334           | 2,5           | 850                 | 1 560                   | 160                                  | 2 000                             | 2 600                          |
| 8     | 15    | 270                 | 350           | –             | 2             | 750                 | 1 700                   | 173                                  | 1 400                             | 1 800                          |
| 8     | 15    | 275                 | 385           | 368           | 3             | 1 060               | 2 000                   | 200                                  | 1 900                             | 2 400                          |
| 8     | 15    | 290                 | 370           | –             | 2             | 765                 | 1 800                   | 181                                  | 1 300                             | 1 700                          |
| 8     | 15    | 295                 | 405           | 388           | 3             | 1 080               | 2 080                   | 206                                  | 1 800                             | 2 200                          |
| 9,5   | 17,7  | 312                 | 408           | –             | 2,5           | 1 040               | 2 400                   | 243                                  | 1 700                             | 2 000                          |
| 9,5   | 17,7  | 315                 | 445           | 422           | 3             | 1 270               | 2 400                   | 232                                  | 1 600                             | 1 900                          |
| 9,5   | 17,7  | 332                 | 428           | –             | 2,5           | 1 060               | 2 550                   | 255                                  | 1 200                             | 1 600                          |
| 9,5   | 17,7  | 335                 | 465           | 442           | 3             | 1 320               | 2 600                   | 248                                  | 1 600                             | 1 900                          |
| 9,5   | 17,7  | 352                 | 448           | –             | 2,5           | 1 100               | 2 650                   | 265                                  | 1 500                             | 1 800                          |
| 9,5   | 17,7  | 357                 | 503           | 477           | 4             | 1 630               | 3 250                   | 305                                  | 1 400                             | 1 700                          |
| 9,5   | 17,7  | 372                 | 468           | –             | 2,5           | 1 140               | 2 800                   | 275                                  | 1 500                             | 1 800                          |
| 9,5   | 17,7  | 377                 | 523           | 497           | 4             | 1 660               | 3 350                   | 310                                  | 1 400                             | 1 700                          |
| 9,5   | 17,7  | 395                 | 505           | –             | 3             | 1 430               | 3 600                   | 340                                  | 1 400                             | 1 700                          |
| 9,5   | 17,7  | 397                 | 543           | 517           | 4             | 1 700               | 3 450                   | 320                                  | 1 300                             | 1 600                          |
| 9,5   | 17,7  | 415                 | 525           | –             | 3             | 1 500               | 3 800                   | 355                                  | 1 300                             | 1 600                          |
| 9,5   | 17,7  | 417                 | 583           | 553           | 4             | 2 160               | 4 500                   | 395                                  | 1 200                             | 1 500                          |
| 9,5   | 17,7  | 435                 | 545           | –             | 3             | 1 530               | 4 000                   | 370                                  | 1 300                             | 1 600                          |
| 9,5   | 17,7  | 437                 | 603           | 573           | 4             | 2 120               | 4 500                   | 395                                  | 1 200                             | 1 500                          |
| 9,5   | 17,7  | 455                 | 585           | –             | 3             | 2 040               | 5 200                   | 480                                  | 1 200                             | 1 500                          |
| 12,5  | 23,5  | 463                 | 627           | 601           | 5             | 2 450               | 5 100                   | 445                                  | 1 100                             | 1 400                          |
| 9,5   | 17,7  | 475                 | 605           | –             | 3             | 2 120               | 5 500                   | 500                                  | 1 100                             | 1 400                          |
| 12,5  | 23,5  | 483                 | 657           | 628           | 5             | 2 600               | 5 400                   | 480                                  | 1 100                             | 1 400                          |
| 9,5   | 17,7  | 497                 | 633           | –             | 4             | 2 360               | 6 100                   | 550                                  | 1 100                             | 1 400                          |
| 12,5  | 23,5  | 503                 | 677           | 648           | 5             | 2 700               | 5 850                   | 510                                  | 1 000                             | 1 300                          |
| 9,5   | 17,7  | 517                 | 653           | –             | 4             | 2 320               | 6 100                   | 540                                  | 1 000                             | 1 300                          |
| 12,5  | 23,5  | 523                 | 697           | 668           | 5             | 2 650               | 5 850                   | 500                                  | 1 000                             | 1 300                          |
| 9,5   | 17,7  | 547                 | 693           | –             | 4             | 2 900               | 7 650                   | 670                                  | 1 000                             | 1 300                          |
| 12,5  | 23,5  | 553                 | 757           | 720           | 5             | 3 450               | 7 350                   | 620                                  | 950                               | 1 200                          |
| 9,5   | 17,7  | 577                 | 733           | –             | 4             | 3 150               | 8 800                   | 760                                  | 950                               | 1 200                          |
| 12,5  | 23,5  | 583                 | 797           | 761           | 5             | 3 900               | 8 300                   | 700                                  | 900                               | 1 100                          |

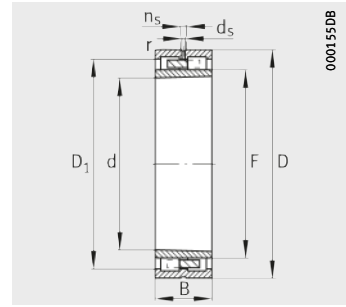


# Super precision cylindrical roller bearings

Double row, with tapered bore (taper 1:12)



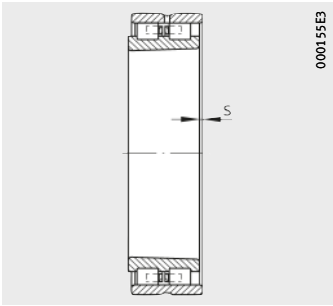
NN30..AS-K-M-SP



NNU49..S-K-M-SP

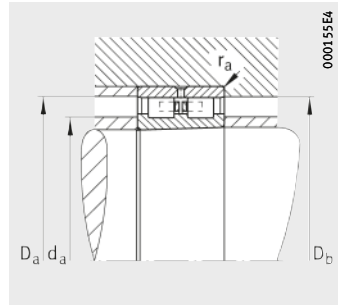
Dimension table (continued) · Dimensions in mm

| Designation         | Mass<br>m<br>≈kg | Dimensions  |      |     |      |                 |      |      |                |                |
|---------------------|------------------|-------------|------|-----|------|-----------------|------|------|----------------|----------------|
|                     |                  | d           | D    | B   | r    | s <sup>1)</sup> | E    | F    | D <sub>1</sub> | d <sub>1</sub> |
|                     |                  |             |      |     | min. |                 |      |      | ≈              | ≈              |
| NUU49/600-S-K-M-SP  | 275              | <b>600</b>  | 800  | 200 | 5    | 6,3             | –    | 666  | 741            | –              |
| NN30/600-AS-K-M-SP  | 377              | <b>600</b>  | 870  | 200 | 6    | 11              | 803  | –    | –              | 692,5          |
| NUU49/630-S-K-M-SP  | 347              | <b>630</b>  | 850  | 218 | 6    | 6,9             | –    | 704  | 784,5          | –              |
| NN30/630-AS-K-M-SP  | 454              | <b>630</b>  | 920  | 212 | 7,5  | 12,5            | 845  | –    | –              | 734,5          |
| NUU49/670-S-K-M-SP  | 399              | <b>670</b>  | 900  | 230 | 6    | 7               | –    | 738  | 828,5          | –              |
| NN30/670-AS-K-M-SP  | 600              | <b>670</b>  | 980  | 230 | 7,5  | 13,5            | 901  | –    | –              | 779            |
| NUU49/710-S-K-M-SP  | 466              | <b>710</b>  | 950  | 243 | 6    | 7,9             | –    | 782  | 875,5          | –              |
| NN30/710-AS-K-M-SP  | 671              | <b>710</b>  | 1030 | 236 | 7,5  | 13              | 951  | –    | –              | 820,5          |
| NUU49/750-S-K-M-SP  | 538              | <b>750</b>  | 1000 | 250 | 6    | 7,5             | –    | 825  | 918,8          | –              |
| NN30/750-AS-K-M-SP  | 739              | <b>750</b>  | 1090 | 250 | 7,5  | 11,5            | 1007 | –    | –              | 859,5          |
| NUU49/800-S-K-M-SP  | 608              | <b>800</b>  | 1060 | 258 | 6    | 10,2            | –    | 880  | 980,8          | –              |
| NN30/800-AS-K-M-SP  | 836              | <b>800</b>  | 1150 | 258 | 7,5  | 12,5            | 1065 | –    | –              | 917,5          |
| NUU49/850-S-K-M-SP  | 689              | <b>850</b>  | 1120 | 272 | 6    | 9,5             | –    | 931  | 1031,8         | –              |
| NN30/850-AS-K-M-SP  | 989              | <b>850</b>  | 1220 | 272 | 7,5  | 13              | 1130 | –    | –              | 974            |
| NUU49/900-S-K-M-SP  | 784              | <b>900</b>  | 1180 | 280 | 6    | 9,3             | –    | 986  | 1093           | –              |
| NN30/900-AS-K-M-SP  | 1100             | <b>900</b>  | 1280 | 280 | 7,5  | 14,5            | 1185 | –    | –              | 1029           |
| NUU49/950-S-K-M-SP  | 962              | <b>950</b>  | 1250 | 300 | 7,5  | 9,3             | –    | 1046 | 1160           | –              |
| NN30/950-AS-K-M-SP  | 1460             | <b>950</b>  | 1360 | 300 | 7,5  | 16,8            | 1255 | –    | –              | 1091           |
| NUU49/1000-S-K-M-SP | 1120             | <b>1000</b> | 1320 | 315 | 7,5  | 9,8             | –    | 1103 | 1224           | –              |
| NN30/1000-AS-K-M-SP | 1490             | <b>1000</b> | 1420 | 308 | 7,5  | 16,5            | 1316 | –    | –              | 1143           |
| NUU49/1060-S-K-M-SP | 1350             | <b>1060</b> | 1400 | 335 | 7,5  | 10,5            | –    | 1160 | 1294           | –              |
| NN30/1060-AS-K-M-SP | 1740             | <b>1060</b> | 1500 | 325 | 9,5  | 17              | 1391 | –    | –              | 1210           |
| NUU49/1120-S-K-M-SP | 1400             | <b>1120</b> | 1460 | 335 | 7,5  | 10,5            | –    | 1220 | 1354           | –              |
| NN30/1120-AS-K-M-SP | 2030             | <b>1120</b> | 1580 | 345 | 9,5  | 18,5            | 1467 | –    | –              | 1278           |
| NUU49/1180-S-K-M-SP | 1680             | <b>1180</b> | 1540 | 355 | 7,5  | 10              | –    | 1285 | 1427,5         | –              |
| NN30/1180-AS-K-M-SP | 2300             | <b>1180</b> | 1660 | 355 | 9,5  | 13,3            | 1542 | –    | –              | 1350           |
| NUU49/1250-S-K-M-SP | 1980             | <b>1250</b> | 1630 | 375 | 9,5  | 9,5             | –    | 1360 | 1511           | –              |
| NUU49/1600-S-K-M-SP | 3770             | <b>1600</b> | 2060 | 462 | 9,5  | 12              | –    | 1740 | 1908           | –              |
| NN30/1700-AS-K-M-SP | 6540             | <b>1700</b> | 2360 | 500 | 15   | 17              | 2185 | –    | –              | 1940           |



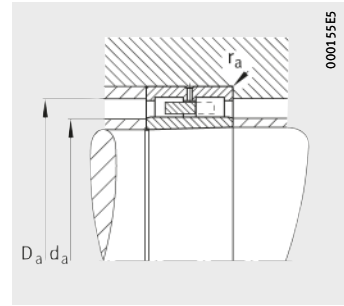
000155E3

1) Axial displacement "s" for NN30 and NNU49



000155E4

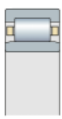
Mounting dimensions for NN30

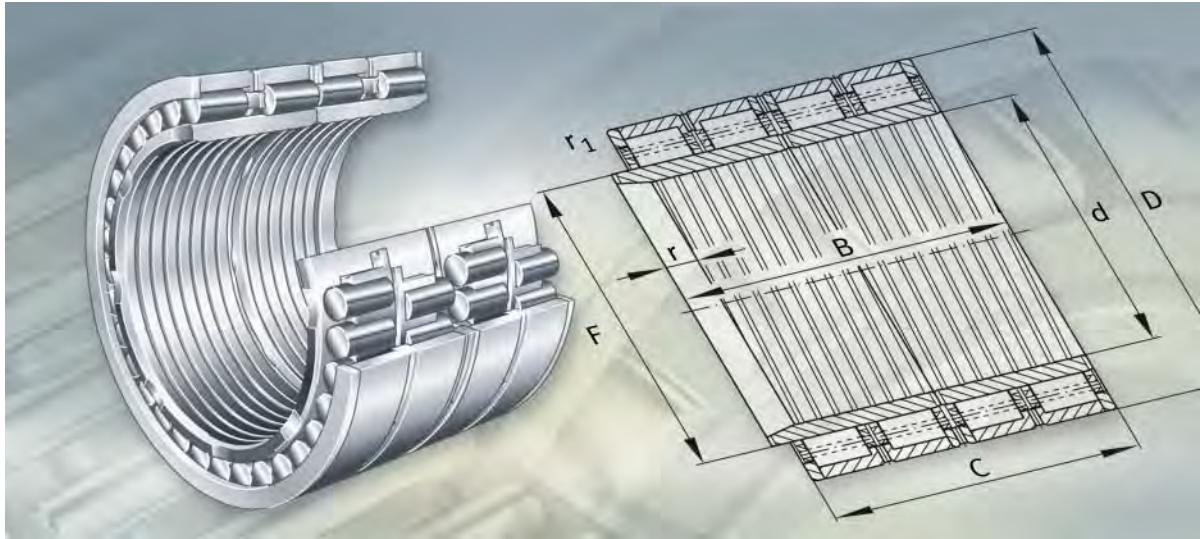


000155E5

Mounting dimensions for NNU49

|       |       | Mounting dimensions |               |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speeds            |                         |
|-------|-------|---------------------|---------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|----------------------------|-------------------------|
| $d_s$ | $n_s$ | $d_a$<br>min.       | $D_a$<br>max. | $D_b$<br>min. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{Or}$<br>kN |                                      | $n_G$ grease<br>$min^{-1}$ | $n_G$ Oil<br>$min^{-1}$ |
| 9,5   | 17,7  | 617                 | 783           | -             | 4             | 3 750               | 10 400                  | 860                                  | 850                        | 1 000                   |
| 12,5  | 23,5  | 623                 | 847           | 808           | 5             | 4 400               | 9 500                   | 760                                  | 850                        | 1 000                   |
| 12,5  | 23,5  | 653                 | 827           | -             | 5             | 4 150               | 11 400                  | 940                                  | 800                        | 950                     |
| 12,5  | 23,5  | 658                 | 892           | 850           | 6             | 4 500               | 9 800                   | 780                                  | 800                        | 950                     |
| 12,5  | 23,5  | 693                 | 877           | -             | 5             | 5 000               | 13 400                  | 1 110                                | 750                        | 900                     |
| 12,5  | 23,5  | 698                 | 952           | 906           | 6             | 5 300               | 11 600                  | 910                                  | 750                        | 900                     |
| 12,5  | 23,5  | 733                 | 927           | -             | 5             | 5 500               | 15 000                  | 1 240                                | 750                        | 900                     |
| 12,5  | 23,5  | 738                 | 1 002         | 956           | 6             | 6 000               | 13 200                  | 1 000                                | 700                        | 850                     |
| 12,5  | 23,5  | 773                 | 977           | -             | 5             | 5 850               | 16 600                  | 1 330                                | 700                        | 850                     |
| 12,5  | 23,5  | 778                 | 1 062         | 1 013         | 6             | 7 100               | 15 300                  | 1 170                                | 670                        | 800                     |
| 12,5  | 23,5  | 823                 | 1 037         | -             | 5             | 6 100               | 17 300                  | 1 350                                | 630                        | 750                     |
| 12,5  | 23,5  | 828                 | 1 120         | 1 071         | 6             | 7 500               | 16 600                  | 1 250                                | 630                        | 750                     |
| 12,5  | 23,5  | 873                 | 1 097         | -             | 5             | 6 300               | 18 000                  | 1 400                                | 600                        | 700                     |
| 12,5  | 23,5  | 878                 | 1 192         | 1 136         | 6             | 8 300               | 18 600                  | 1 700                                | 600                        | 700                     |
| 12,5  | 23,5  | 923                 | 1 157         | -             | 5             | 7 100               | 20 400                  | 1 920                                | 560                        | 670                     |
| 12,5  | 23,5  | 928                 | 1 252         | 1 191         | 6             | 8 300               | 19 300                  | 1 740                                | 560                        | 670                     |
| 12,5  | 23,5  | 978                 | 1 222         | -             | 6             | 8 150               | 24 000                  | 2 190                                | 530                        | 630                     |
| 12,5  | 23,5  | 978                 | 1 332         | 1 261         | 6             | 9 500               | 22 400                  | 1 950                                | 530                        | 630                     |
| 12,5  | 23,5  | 1 028               | 1 292         | -             | 6             | 9 000               | 26 500                  | 2 390                                | 500                        | 600                     |
| 12,5  | 23,5  | 1 028               | 1 392         | 1 322         | 6             | 10 400              | 25 000                  | 2 130                                | 500                        | 600                     |
| 12,5  | 23,5  | 1 088               | 1 372         | -             | 6             | 10 400              | 30 000                  | 2 600                                | 480                        | 560                     |
| 12,5  | 23,5  | 1 094               | 1 466         | 1 397         | 8             | 11 400              | 27 500                  | 2 320                                | 480                        | 560                     |
| 12,5  | 23,5  | 1 148               | 1 432         | -             | 6             | 10 400              | 31 000                  | 2 650                                | 450                        | 530                     |
| 12,5  | 23,5  | 1 154               | 1 546         | 1 473         | 8             | 12 200              | 30 000                  | 2 030                                | 450                        | 530                     |
| 12,5  | 23,5  | 1 208               | 1 512         | -             | 6             | 12 200              | 37 500                  | 3 200                                | 430                        | 500                     |
| 12,5  | 23,5  | 1 214               | 1 626         | 1 548         | 8             | 13 400              | 32 500                  | 2 650                                | 430                        | 500                     |
| 12,5  | 23,5  | 1 284               | 1 596         | -             | 8             | 13 700              | 41 500                  | 2 850                                | 400                        | 480                     |
| 12,5  | 23,5  | 1 634               | 2 026         | -             | 8             | 18 300              | 61 000                  | 4 800                                | 320                        | 380                     |
| 20    | 41    | 1 750               | 2 310         | 2 191         | 12            | 23 200              | 64 000                  | 3 850                                | 300                        | 360                     |



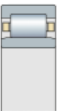


**Four-row cylindrical roller bearings  
with cage**



# Four-row cylindrical roller bearings with cage

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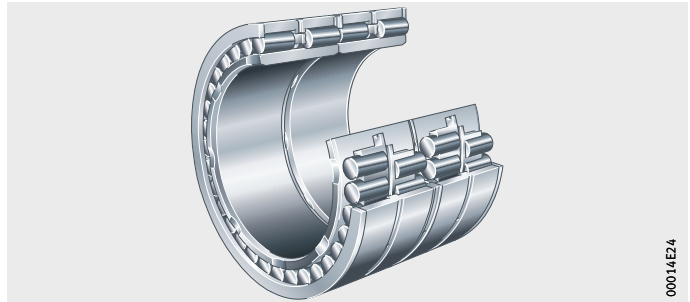


# Product overview **Four-row cylindrical roller bearings with cage**

## **Non-locating bearings**

With cylindrical bore for tight fit

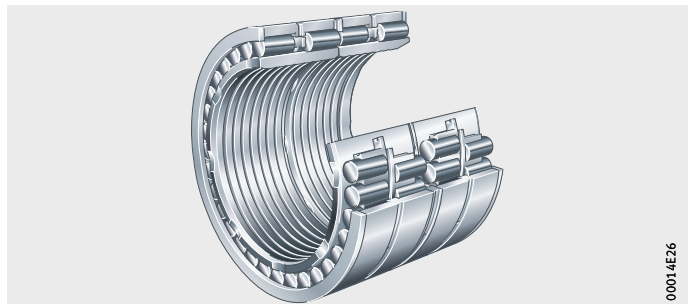
Z-5..ZL4-01, F-8..ZL4-01



00014E24

With cylindrical bore for loose fit

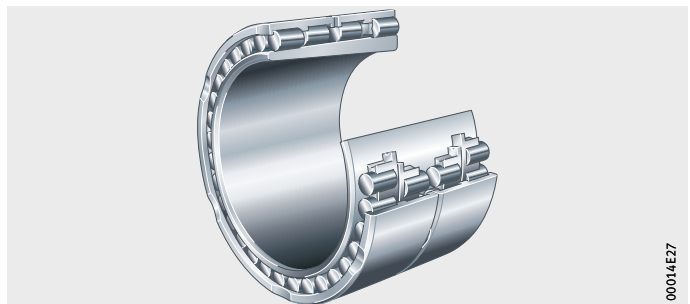
Z-5..ZL4-02, F-8..ZL4-02



00014E26

With tapered bore

Z-5..ZL4-03, F-8..ZL4-03



00014E27

# Four-row cylindrical roller bearings with cage

**Features** Four-row cylindrical roller bearings comprise solid bearing rings and cylindrical roller and cage assemblies with solid cages. The bearings are suitable for very high radial loads and high speeds and are used principally in rolling mills and roller presses. Four-row cylindrical roller bearings are separable and are therefore easy to mount and dismount.

## Four-row cylindrical roller bearings with cylindrical bore

Bearings with a cylindrical bore are available in special designs with non-standardised main dimensions and designations. The design selected will depend on the type of application.

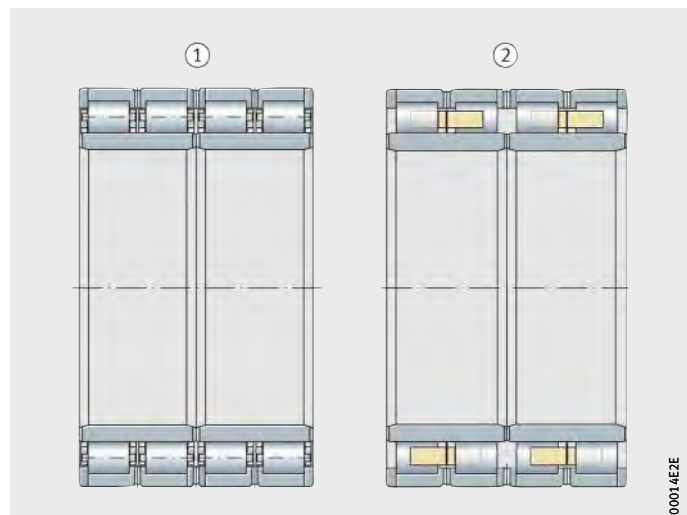
### Bearings for tight fit on the roll journal

Four-row cylindrical roller bearings are generally designed such that they have a tight fit on the roll journal. In these bearings, the inner rings and outer rings are of the same width, *Figure 1* and *Figure 2*, page 418.

- Design 1
- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers, two ribless inner rings
  - Lubrication groove and lubrication holes in the outer rings and in the intermediate ring, lubrication grooves in the end faces of the inner rings
  - One steel pin cage per row of rollers.
- Design 2
- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers, two ribless inner rings
  - Lubrication groove and lubrication holes in the outer rings and in the intermediate ring, lubrication grooves in the end faces of the inner rings
  - Brass or steel solid cages.

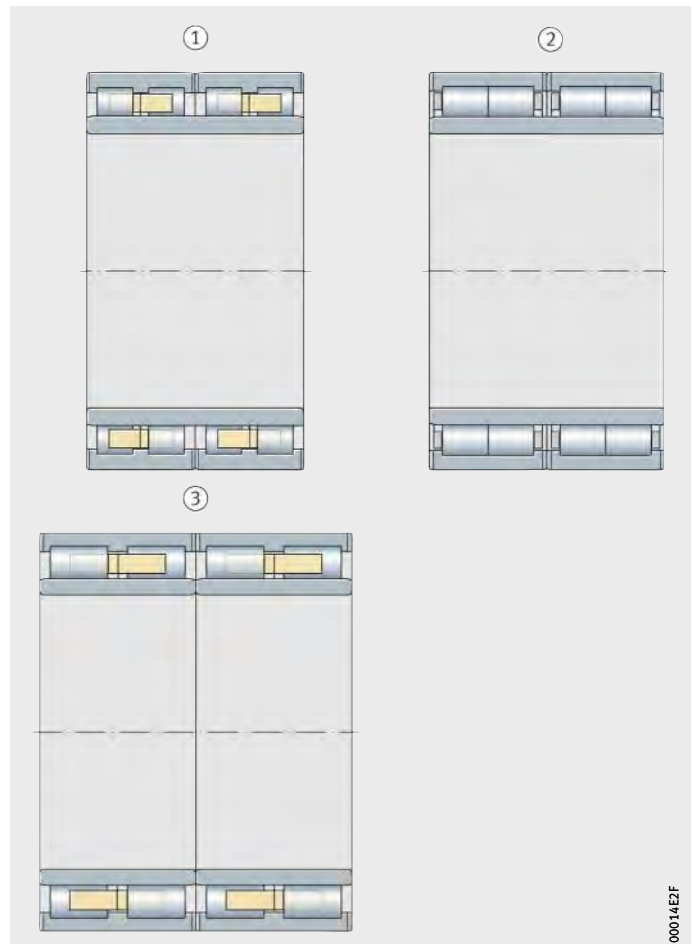
- ① Design 1  
② Design 2

*Figure 1*  
Four-row cylindrical roller bearings for tight fit



## Four-row cylindrical roller bearings with cage

- Design 3
  - Two outer rings each with three rigid ribs, ribless single-piece inner ring
  - Lubrication grooves in the end faces of the outer rings
  - Brass or steel solid cages.
- Design 4
  - Two outer rings each with three rigid ribs, ribless single-piece inner ring
  - Lubrication grooves in the end faces of the outer rings
  - Brass or steel solid cages for each two rows of rollers.
- Design 5
  - Two outer rings each with three rigid ribs, two ribless inner rings
  - Lubrication grooves in the end faces of the outer rings
  - Brass or steel solid cages.



*Figure 2*  
Four-row cylindrical roller bearings  
for tight fit  
(continued)

### Bearings for loose fit on the roll journal

In Designs 6 to 10 for loose fit, the inner rings are wider than the outer rings. Due to the clearance between the inner ring and the journal, heating and wear of the journal occurs, so it is important to achieve good lubrication of the fit joint.

The radial grooves in the lateral faces of the inner rings are intended to achieve this objective.

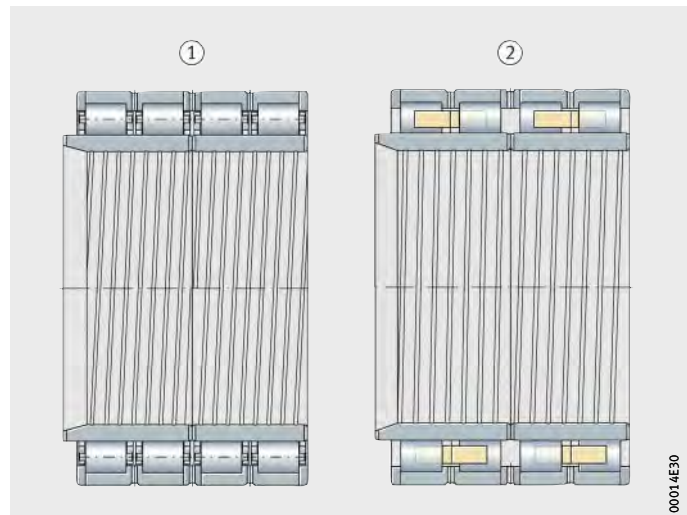
In Designs 6 to 8 and 10, lubrication of the journal is improved by the helical groove in the inner ring bore. The inner rings are made from case hardening steel, the radial internal clearance C2 is smaller than normal, *Figure 3* and *Figure 4*, page 420.

The bearings for a loose fit do not achieve the same high speeds as the bearings for a tight fit on the roll journal, *Figure 1*, page 417 and *Figure 2*, page 418.

- Design 6
- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers, two ribless inner rings
  - Lubrication groove and lubrication holes in the outer rings and in the intermediate ring, lubrication grooves in the end faces of the inner rings
  - One steel pin cage per row of rollers.
- Design 7
- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers
  - Two ribless inner rings, lubrication groove and lubrication holes in the outer rings and in the intermediate ring, lubrication grooves in the end faces of the inner rings
  - Brass or steel solid cages.

- ① Design 6  
② Design 7

*Figure 3*  
Four-row cylindrical roller bearings for loose fit



## Four-row cylindrical roller bearings with cage

- Design 8
  - Two outer rings each with three rigid ribs, two ribless inner rings
  - Lubrication grooves in the end faces of the inner and outer rings
  - Brass or steel solid cages.
- Design 9
  - Two outer rings each with three rigid ribs, two ribless inner rings
  - Lubrication groove and lubrication holes in the outer rings, lubrication grooves in the end faces of the inner rings
  - Brass or steel solid cages.



*Figure 4*  
Four-row cylindrical roller bearings  
for loose fit  
(continued)

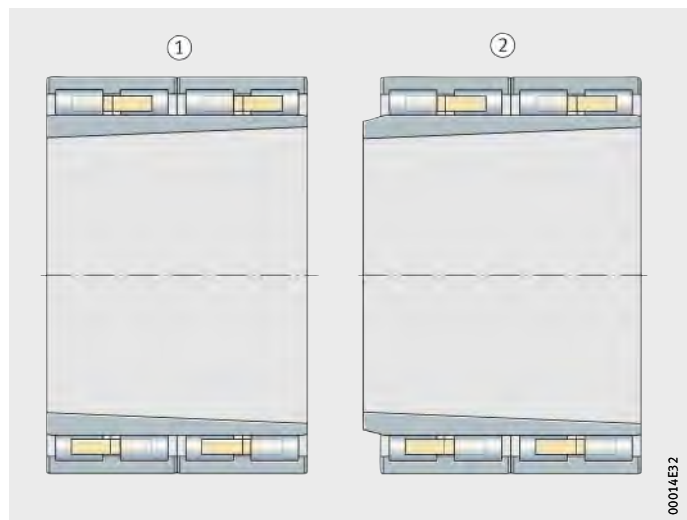
**Four-row cylindrical roller bearings with tapered bore**

Four-row cylindrical roller bearings with tapered bore (taper 1:12) are frequently used as a replacement for oil film bearings. In these bearings, the radial internal clearance or preload can be set to an optimum value. The ribless inner ring is of a single-piece design, *Figure 5* and *Figure 6*, page 422.

- Design 10
  - Two outer rings each with three rigid ribs
  - Lubrication grooves in the end faces of the outer rings
  - Brass or steel solid cages.
- Design 11
  - Two outer rings each with three rigid ribs
  - Lubrication grooves in the end faces of the outer rings
  - Brass or steel solid cages.

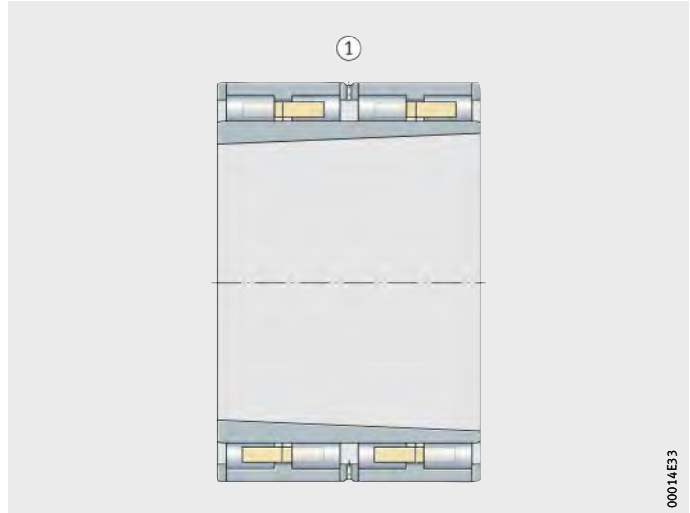
- ① Design 10
- ② Design 11

*Figure 5*  
Four-row cylindrical roller bearings with tapered bore



# Four-row cylindrical roller bearings with cage

- Design 12
- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers
  - Lubrication groove and lubrication holes in the intermediate ring
  - Brass or steel solid cages.



① Design 12

*Figure 6*  
Four-row cylindrical roller bearing  
with tapered bore  
(continued)

## Non-locating bearings

All the four-row cylindrical roller bearings described here are non-locating bearings and can support radial forces only. High axial forces are supported by using, for example, axial tapered roller bearings, axial spherical roller bearings or double row tapered roller bearings with a large contact angle. Angular contact ball bearings and deep groove ball bearings are used as axial bearings where small axial forces are present.

## Sealing

Four-row cylindrical roller bearings are supplied without seals.

## Lubricant

The lubricant should be supplied at two points. Many bearings have lubrication grooves and lubrication holes in the outer ring. In other bearings, there are radial lubrication grooves in the end faces of the outer rings.

## Operating temperature

The four-row cylindrical roller bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .



For continuous operation above  $+120\text{ }^{\circ}\text{C}$ , please contact us.



**Cages** In four-row cylindrical roller bearings for high rolling speeds, roller-guided solid cages made from brass or steel are used. These are used, for example, for work rolls in four-high stands and in small section and wire rolling lines.

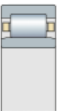
Pin cages allow the use of a large number of through-drilled rollers and thus very high load carrying capacity. Their particular strength is important in the case of bearings in large stands that are subjected to strong acceleration and deceleration, for example in reversing type operation. This design is also used for the backup rolls in four-high stands.

**Suffixes** The design of the four-row cylindrical roller bearings (for example radial internal clearance, accuracy, cage) is specified in the designation (Z-5..ZL or F-8..ZL). Please contact us for relevant information.

Where there are deviations from the original design, suffixes are used, for an example see the following table:

**Available designs**

| Suffix | Description   | Design                                      |
|--------|---|---|
| C4     | Radial internal clearance larger than C3  | Special design, available by agreement only |
| N12BA  | Two double row cylindrical roller bearings in matched sets (when ordering, state double the quantity) |   |



# Four-row cylindrical roller bearings with cage

## Design and safety guidelines Minimum radial load



In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{0r}/60$  is necessary.

If  $F_{r \min} < C_{0r}/60$ , please contact us.

## Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_r$$

$P$  kN  
Equivalent dynamic bearing load  
 $F_r$  kN  
Radial dynamic bearing load.

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0r}$  kN  
Radial static bearing load.

## Design of bearing arrangements Tolerances of the roll journal

The tolerance of the roll journal depends on whether the bearing should have a tight fit or loose fit.

For four-row cylindrical roller bearings that should have a tight fit on the roll journal, we recommend the values in the following table:

### Bearing bore and journal tolerance

| Nominal bearing bore<br>$d$<br>mm | Journal tolerance<br>mm |
|-----------------------------------|-------------------------|
| < 200                             | n6                      |
| 200 – 400                         | p6/r6                   |
| > 400 – 630                       | +0,200 – +0,260         |
| > 630 – 800                       | +0,250 – +0,330         |
| > 800 – 1250                      | +0,320 – +0,420         |
| > 1250 – 1400                     | +0,400 – +0,550         |
| > 1400 – 1600                     | +0,520 – +0,650         |

Where the bearing inner ring has a loose fit, the roll journal should have a tolerance to e7.



For bearings with a tapered bore and at high speeds, please contact us to discuss tolerances.

### Tolerances for the chock

We recommend the following tolerances for the bore of the chock:

- H6 for  $D \leq 800$  mm
- H7 for  $D > 800$  mm.



For bearings with a tapered bore, please contact us to discuss the tolerances for the adjacent parts.

## Accuracy

The dimensional and running accuracy of the four-row cylindrical roller bearings of the basic design correspond to tolerance class PN to DIN 620.

### Radial internal clearance of cylindrical roller bearings with cylindrical bore

Four-row cylindrical roller bearings with a cylindrical bore have, in most cases, a radial internal clearance to C3 or C4 to DIN 620-4.

Bearings for a loose fit on the roll journal are, however, normally supplied with an internal clearance C2.

#### Radial internal clearance (cylindrical bore)

| Bore    |       | Radial internal clearance |      |          |      |          |      |          |      |
|---------|-------|---------------------------|------|----------|------|----------|------|----------|------|
| d<br>mm |       | C2<br>μm                  |      | CN<br>μm |      | C3<br>μm |      | C4<br>μm |      |
| over    | incl. | min.                      | max. | min.     | max. | min.     | max. | min.     | max. |
| 200     | 225   | 45                        | 105  | 105      | 165  | 160      | 220  | 220      | 280  |
| 225     | 250   | 45                        | 110  | 110      | 175  | 170      | 235  | 235      | 300  |
| 250     | 280   | 55                        | 125  | 125      | 195  | 190      | 260  | 260      | 330  |
| 280     | 315   | 55                        | 130  | 130      | 205  | 200      | 275  | 275      | 350  |
| 315     | 355   | 65                        | 145  | 145      | 225  | 225      | 305  | 305      | 385  |
| 355     | 400   | 100                       | 190  | 190      | 280  | 280      | 370  | 370      | 460  |
| 400     | 450   | 110                       | 210  | 210      | 310  | 310      | 410  | 410      | 510  |
| 450     | 500   | 110                       | 220  | 220      | 330  | 330      | 440  | 440      | 550  |
| 500     | 560   | 120                       | 240  | 240      | 360  | 360      | 480  | 480      | 600  |
| 560     | 630   | 140                       | 260  | 260      | 380  | 380      | 500  | 500      | 620  |
| 630     | 710   | 145                       | 285  | 285      | 425  | 425      | 565  | 565      | 705  |
| 710     | 800   | 150                       | 310  | 310      | 470  | 470      | 630  | 630      | 790  |
| 800     | 900   | 180                       | 350  | 350      | 520  | 520      | 690  | 690      | 860  |
| 900     | 1000  | 200                       | 390  | 390      | 580  | 580      | 770  | 770      | 960  |
| 1000    | 1120  | 220                       | 430  | 430      | 640  | 640      | 850  | 850      | 1060 |
| 1120    | 1250  | 230                       | 470  | 470      | 710  | 710      | 950  | 950      | 1190 |
| 1250    | 1400  | 270                       | 530  | 530      | 790  | 790      | 1050 | 1050     | 1310 |
| 1400    | 1600  | 330                       | 610  | 610      | 890  | 890      | 1170 | 1170     | 1450 |

### Radial internal clearance of cylindrical roller bearings with tapered bore

Four-row cylindrical roller bearings with a tapered bore are normally supplied with an internal clearance C3 or C4 to DIN 620-4.

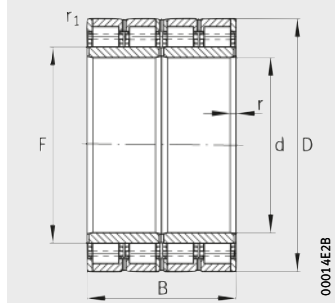
#### Radial internal clearance (tapered bore)

| Bore    |       | Radial internal clearance |      |          |      |          |      |
|---------|-------|---------------------------|------|----------|------|----------|------|
| d<br>mm |       | CN<br>μm                  |      | C3<br>μm |      | C4<br>μm |      |
| over    | incl. | min.                      | max. | min.     | max. | min.     | max. |
| 225     | 250   | 170                       | 235  | 220      | 285  | 270      | 335  |
| 250     | 280   | 185                       | 255  | 240      | 310  | 295      | 365  |
| 280     | 315   | 205                       | 280  | 265      | 340  | 325      | 400  |
| 315     | 355   | 225                       | 305  | 290      | 370  | 355      | 435  |
| 355     | 400   | 255                       | 345  | 330      | 420  | 405      | 495  |
| 400     | 450   | 285                       | 385  | 370      | 470  | 455      | 555  |
| 450     | 500   | 315                       | 425  | 410      | 520  | 505      | 615  |

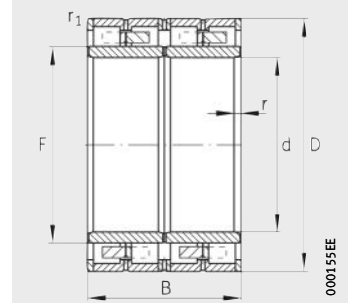


# Cylindrical roller bearings

Four-row,  
with cylindrical bore,  
for tight fit on roll journals



Design 1  
With pin cage



Design 2  
With solid brass cage

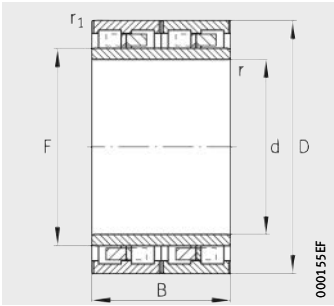
**Dimension table** - Dimensions in mm

| Designation          | Design          | Mass<br>m<br>≈kg | Dimensions |     |     |       |
|----------------------|-----------------|------------------|------------|-----|-----|-------|
|                      |                 |                  | d          | D   | B   | F     |
| Z-509216.ZL          | 5               | 59               | 220        | 320 | 210 | 246   |
| Z-541452.ZL          | 3               | 67,6             | 220        | 330 | 230 | 249   |
| Z-525147.ZL          | 2               | 95,4             | 220        | 340 | 290 | 250   |
| Z-508727.02.ZL       | 3 <sup>1)</sup> | 57,8             | 230        | 330 | 206 | 260   |
| Z-504547.ZL          | 4               | 46,9             | 240        | 330 | 180 | 265   |
| Z-508368.ZL          | 3               | 57,4             | 240        | 330 | 220 | 270   |
| Z-512972.ZL          | 4               | 59,9             | 240        | 340 | 200 | 266   |
| Z-513703.ZL          | 3               | 63,4             | 240        | 340 | 220 | 268   |
| Z-514959.ZL          | 2               | 101              | 240        | 360 | 290 | 270   |
| Z-522310.ZL          | 3 <sup>3)</sup> | 59,7             | 250        | 340 | 230 | 276   |
| Z-533880.ZL          | 3               | 72,6             | 260        | 360 | 230 | 292,2 |
| Z-507336.02.ZL       | 3               | 76,4             | 260        | 370 | 220 | 292   |
| Z-507336.ZL          | 3               | 76,4             | 260        | 370 | 220 | 292   |
| Z-518214.ZL          | 2               | 134              | 260        | 400 | 290 | 296   |
| Z-521065.ZL          | 2               | 151              | 260        | 400 | 335 | 294   |
| Z-517423.ZL          | 3               | 80,4             | 265        | 370 | 234 | 300   |
| Z-536134.ZL          | 3               | 114              | 275        | 400 | 285 | 308   |
| Z-507339.ZL          | 3 <sup>1)</sup> | 81,5             | 280        | 390 | 220 | 312   |
| Z-507339.02.ZL       | 3 <sup>1)</sup> | 81,7             | 280        | 390 | 220 | 312   |
| Z-513729.01.ZL       | 3 <sup>3)</sup> | 101              | 280        | 390 | 275 | 312   |
| Z-527104.ZL          | 2               | 99,9             | 280        | 390 | 275 | 308   |
| Z-513342.ZL-N12BA    | 5 <sup>2)</sup> | 57,1             | 280        | 400 | 286 | 316   |
| Z-510350.ZL-N12BA-C4 | 5 <sup>2)</sup> | 66,2             | 280        | 410 | 300 | 313   |
| Z-517796.ZL          | 3               | 164              | 290        | 440 | 310 | 328   |
| Z-524289.02.ZL       | 2               | 130              | 300        | 420 | 300 | 332   |
| Z-517795.ZL          | 1               | 233              | 300        | 460 | 350 | 341   |
| Z-574469.ZL          | 3               | 115              | 310        | 440 | 240 | 345   |
| Z-532220.ZL          | 1               | 161              | 320        | 440 | 340 | 350   |
| F-804571.ZL          | 4               | 138              | 320        | 460 | 240 | 364   |
| Z-532592.ZL          | 3               | 196              | 320        | 470 | 350 | 357   |
| Z-532583.ZL          | 1               | 193              | 320        | 470 | 350 | 357   |
| Z-541851.ZL          | 2               | 219              | 320        | 480 | 350 | 364   |
| Z-513654.01.ZL       | 1               | 225              | 320        | 480 | 350 | 364   |

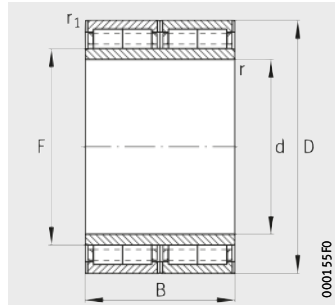
<sup>1)</sup> Steel double comb cage.

<sup>2)</sup> Two double row bearings mounted in a set with a circumferential lubrication groove and lubrication holes in the outer rings.

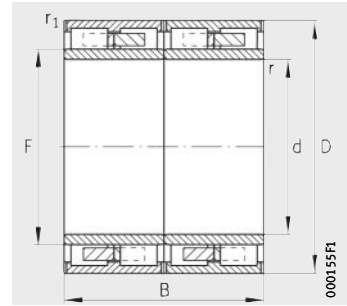
<sup>3)</sup> Circumferential lubrication groove and lubrication holes in the outer rings.



Design 3  
With solid brass cage

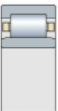


Design 4  
With solid brass cage



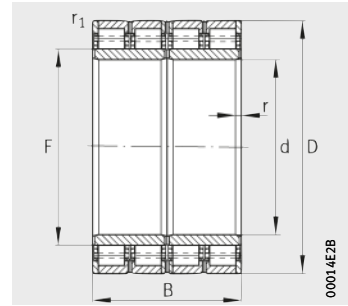
Design 5  
With solid brass cage

|          |                | Basic load ratings     |                          | Fatigue limit load |
|----------|----------------|------------------------|--------------------------|--------------------|
| r        | r <sub>1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub>    |
| min.     | min.           | kN                     | kN                       | kN                 |
| 2,1      | 2,1            | 2 450                  | 4 300                    | 480                |
| 3        | 3              | 2 360                  | 3 900                    | 420                |
| 3        | 3              | 3 250                  | 5 400                    | 590                |
| 2        | 2              | 2 160                  | 3 900                    | 420                |
| 2,1      | 2,1            | 2 040                  | 3 900                    | 415                |
| 2        | 2              | 2 080                  | 4 250                    | 460                |
| 3        | 3              | 2 500                  | 4 500                    | 490                |
| 3        | 3              | 2 400                  | 4 250                    | 460                |
| 12,5X30° | 1,2            | 3 450                  | 6 000                    | 640                |
| 2,1      | 2,1            | 2 120                  | 4 050                    | 435                |
| 4        | 4              | 2 500                  | 5 000                    | 520                |
| 3        | 3              | 2 200                  | 4 050                    | 430                |
| 3        | 3              | 2 200                  | 4 050                    | 430                |
| 4        | 4              | 4 000                  | 6 800                    | 710                |
| 4        | 1,5            | 4 300                  | 7 200                    | 760                |
| 2,1      | 2,1            | 2 500                  | 5 100                    | 530                |
| 4        | 2,5            | 3 750                  | 6 800                    | 325                |
| 3        | 3              | 2 280                  | 4 300                    | 450                |
| 3        | 3              | 2 400                  | 4 550                    | 480                |
| 2,1      | 2,1            | 3 150                  | 6 400                    | 670                |
| 3        | 2              | 3 600                  | 6 800                    | 700                |
| 4        | 4              | 2 500                  | 6 300                    | 560                |
| 4        | 4              | 2 850                  | 6 900                    | 620                |
| 4        | 4              | 4 250                  | 6 950                    | 700                |
| 7X20°    | 1,5            | 4 150                  | 8 000                    | 810                |
| 4        | 2,5            | 5 500                  | 9 650                    | 960                |
| 3        | 3              | 3 250                  | 5 700                    | 580                |
| 4        | 1,5            | 5 000                  | 10 400                   | 1 050              |
| 3        | 3              | 3 750                  | 7 200                    | 710                |
| 5        | –              | 5 200                  | 9 300                    | 930                |
| 5        | –              | 5 850                  | 10 800                   | 1 080              |
| 4        | 1,5            | 5 600                  | 9 800                    | 980                |
| 12X20°   | 1,5            | 5 850                  | 10 800                   | 1 070              |



# Cylindrical roller bearings

Four-row, with cylindrical bore,  
for tight fit on roll journals



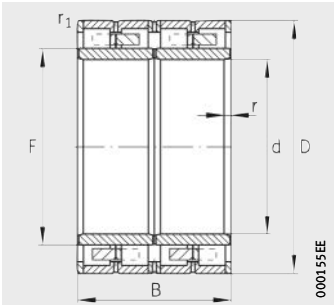
Design 1  
With pin cage

**Dimension table** (continued) · Dimensions in mm

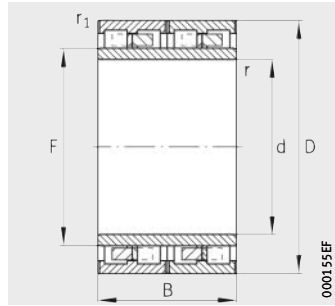
| Designation       | Design          | Mass<br>m<br>≈kg | Dimensions |     |     |     |
|-------------------|-----------------|------------------|------------|-----|-----|-----|
|                   |                 |                  | d          | D   | B   | F   |
| Z-543447.ZL       | 2               | 174              | <b>330</b> | 460 | 340 | 365 |
| Z-521593.01.ZL    | 1               | 176              | <b>330</b> | 460 | 340 | 365 |
| Z-527634.ZL       | 2               | 205              | <b>340</b> | 480 | 350 | 378 |
| Z-525837.01.ZL    | 1               | 209              | <b>340</b> | 480 | 350 | 378 |
| Z-541185.ZL       | 1               | 203              | <b>340</b> | 480 | 350 | 378 |
| Z-517794.ZL       | 1               | 253              | <b>340</b> | 500 | 370 | 385 |
| Z-545171.ZL       | 1               | 379              | <b>340</b> | 560 | 380 | 396 |
| Z-532381.ZL-N12BA | 5 <sup>1)</sup> | 122              | <b>350</b> | 500 | 380 | 389 |
| Z-532001.ZL       | 1               | 268              | <b>350</b> | 500 | 410 | 388 |
| Z-568450.ZL       | 2               | 220              | <b>350</b> | 520 | 300 | 401 |
| Z-562913.ZL       | 2               | 264              | <b>360</b> | 520 | 380 | 405 |
| Z-517793.01.ZL    | 1               | 274              | <b>360</b> | 520 | 380 | 405 |
| Z-543975.ZL       | 2               | 250              | <b>370</b> | 520 | 380 | 409 |
| Z-524678.01.ZL    | 1               | 251              | <b>370</b> | 520 | 380 | 409 |
| Z-541192.ZL       | 1               | 261              | <b>370</b> | 520 | 380 | 409 |
| Z-576360.ZL       | 3 <sup>2)</sup> | 182              | <b>380</b> | 520 | 290 | 418 |
| Z-541982.ZL       | 2               | 217              | <b>380</b> | 540 | 300 | 421 |
| Z-545768.ZL       | 1               | 221              | <b>380</b> | 540 | 300 | 421 |
| Z-544794.ZL       | 2               | 298              | <b>380</b> | 540 | 400 | 422 |
| Z-517792.ZL       | 1               | 303              | <b>380</b> | 540 | 400 | 422 |
| Z-578278.ZL       | 1               | 224              | <b>390</b> | 540 | 320 | 431 |
| Z-533426.ZL       | 1               | 254              | <b>400</b> | 540 | 380 | 436 |
| Z-513769.01.ZL    | 1               | 321              | <b>400</b> | 560 | 410 | 445 |
| Z-542395.ZL       | 2               | 408              | <b>400</b> | 590 | 440 | 450 |
| Z-513770.ZL       | 1               | 421              | <b>400</b> | 590 | 440 | 450 |
| Z-543736.ZL       | 2               | 280              | <b>410</b> | 560 | 400 | 450 |
| Z-561005.ZL       | 1               | 293              | <b>410</b> | 560 | 400 | 450 |
| Z-517436.ZL       | 1               | 435              | <b>410</b> | 600 | 440 | 460 |
| Z-533053.ZL-N12BA | 5 <sup>1)</sup> | 128              | <b>420</b> | 580 | 320 | 463 |
| Z-545467.ZL       | 2               | 409              | <b>420</b> | 600 | 440 | 470 |
| Z-517464.ZL       | 1               | 414              | <b>420</b> | 600 | 440 | 470 |
| Z-526415.ZL       | 1               | 243              | <b>430</b> | 570 | 340 | 465 |
| Z-543174.ZL       | 1               | 386              | <b>433</b> | 600 | 435 | 478 |

1) Two double row bearings mounted in a set with a circumferential lubrication groove and lubrication holes in the outer rings.

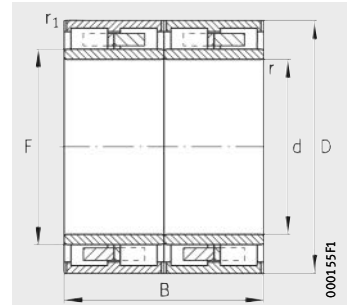
2) Circumferential lubrication groove and lubrication holes in the outer rings.



Design 2  
With solid brass cage

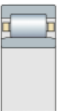


Design 3  
With solid brass cage



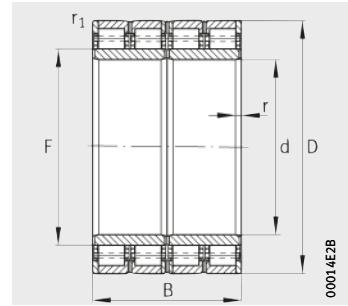
Design 5  
With solid brass cage

|          |                | Basic load ratings     |                          | Fatigue limit load |
|----------|----------------|------------------------|--------------------------|--------------------|
| r        | r <sub>1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub>    |
| min.     | min.           | kN                     | kN                       | kN                 |
| 10,5X20° | 1,5            | 4 650                  | 9 500                    | 950                |
| 4        | 2              | 5 100                  | 10 800                   | 1 070              |
| 10X20°   | 1,5            | 5 300                  | 11 000                   | 1 100              |
| 10X20°   | 1,5            | 5 700                  | 12 000                   | 1 200              |
| 5        | 1,5            | 5 700                  | 12 000                   | 1 200              |
| 6        | 3              | 6 400                  | 12 500                   | 1 220              |
| 4        | 1,5            | 7 650                  | 12 200                   | 1 150              |
| 5        | 5              | 4 200                  | 11 200                   | 940                |
| 5        | 2              | 7 100                  | 14 300                   | 1 410              |
| 5        | 5              | 5 100                  | 8 800                    | 830                |
| 13,5X20° | 2              | 6 200                  | 12 200                   | 1 190              |
| 13,5X20° | 2              | 6 550                  | 13 200                   | 1 270              |
| 10X20°   | 1,5            | 6 200                  | 12 200                   | 1 190              |
| 10X20°   | 1,5            | 6 400                  | 12 900                   | 1 250              |
| 10X20°   | 1,5            | 6 400                  | 12 900                   | 1 250              |
| 4        | 4              | 4 500                  | 9 000                    | 850                |
| 3        | 1              | 5 100                  | 9 150                    | 840                |
| 8,5X20°  | 2              | 5 850                  | 10 800                   | 1 010              |
| 5        | 2              | 6 700                  | 13 400                   | 1 300              |
| 5        | 2              | 7 100                  | 15 000                   | 1 430              |
| 10X20°   | 3              | 5 500                  | 11 000                   | 1 100              |
| 5        | 2              | 6 400                  | 14 000                   | 1 330              |
| 12X20°   | 2              | 7 800                  | 16 600                   | 1 590              |
| 4        | 4              | 8 300                  | 16 000                   | 1 490              |
| 4        | 4              | 9 150                  | 17 600                   | 1 670              |
| 11X20°   | 2              | 6 950                  | 14 600                   | 1 380              |
| 11X20°   | 2              | 7 650                  | 16 600                   | 1 550              |
| 13X20°   | 1,6            | 9 300                  | 18 600                   | 1 740              |
| 4        | 4              | 3 900                  | 10 400                   | 830                |
| 14X20°   | 1,6            | 8 150                  | 17 000                   | 1 550              |
| 14X20°   | 1,6            | 8 800                  | 19 000                   | 1 760              |
| 5        | 2              | 6 000                  | 12 700                   | 1 170              |
| 14X30°   | 2              | 9 150                  | 19 600                   | 1 810              |



# Cylindrical roller bearings

Four-row, with cylindrical bore,  
for tight fit on roll journals



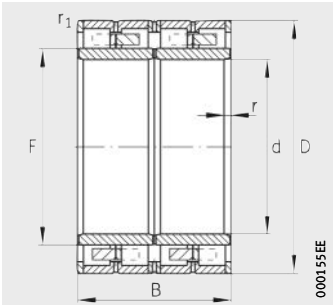
Design 1  
With pin cage

Dimension table (continued) · Dimensions in mm

| Designation    | Design          | Mass<br>m<br>≈kg | Dimensions     |         |     |       |
|----------------|-----------------|------------------|----------------|---------|-----|-------|
|                |                 |                  | d              | D       | B   | F     |
| Z-545628.ZL    | 2               | 427              | <b>440</b>     | 620     | 450 | 487   |
| Z-517454.01.ZL | 1               | 434              | <b>440</b>     | 620     | 450 | 487   |
| Z-560371.ZL    | 1               | 479              | <b>447,295</b> | 635,176 | 464 | 495   |
| Z-542648.ZL    | 1               | 311              | <b>450</b>     | 590     | 435 | 486   |
| Z-529095.ZL    | 2               | 1 140            | <b>459,95</b>  | 760     | 600 | 535   |
| Z-541756.ZL    | 1               | 375              | <b>460</b>     | 650     | 355 | 509,5 |
| Z-513584.01.ZL | 1               | 446              | <b>460</b>     | 650     | 424 | 510   |
| Z-518846.ZL    | 1               | 498              | <b>460</b>     | 650     | 470 | 509   |
| Z-547660.ZL    | 2               | 429              | <b>480</b>     | 650     | 450 | 525   |
| Z-547659.ZL    | 1               | 437              | <b>480</b>     | 650     | 450 | 525   |
| Z-533522.ZL    | 1               | 500              | <b>480</b>     | 680     | 420 | 528   |
| Z-514445.02.ZL | 1               | 582              | <b>480</b>     | 680     | 500 | 532   |
| Z-546152.ZL    | 1               | 656              | <b>480</b>     | 700     | 500 | 534   |
| Z-523399.ZL    | 2               | 691              | <b>480</b>     | 700     | 530 | 536   |
| Z-533023.ZL    | 1               | 464              | <b>500</b>     | 670     | 450 | 556   |
| Z-546335.ZL    | 1               | 479              | <b>500</b>     | 680     | 450 | 550   |
| Z-517692.ZL    | 1               | 612              | <b>500</b>     | 700     | 500 | 554   |
| Z-530488.ZL    | 1               | 640              | <b>500</b>     | 710     | 480 | 558   |
| Z-513378.01.ZL | 1               | 735              | <b>500</b>     | 720     | 530 | 568   |
| Z-567725.01.ZL | 1 <sup>1)</sup> | 513              | <b>510</b>     | 680     | 500 | 560   |
| Z-541646.ZL    | 1               | 728              | <b>510</b>     | 730     | 520 | 565   |
| Z-517690.ZL    | 1               | 892              | <b>510</b>     | 760     | 550 | 570   |
| Z-541647.ZL    | 1               | 785              | <b>520</b>     | 750     | 530 | 576   |
| Z-537383.ZL    | 2               | 740              | <b>530</b>     | 760     | 520 | 587   |
| Z-531597.ZL    | 1               | 797              | <b>530</b>     | 760     | 520 | 587   |
| Z-517689.01.ZL | 1               | 946              | <b>530</b>     | 780     | 570 | 601   |
| Z-543481.ZL    | 1               | 1 650            | <b>530</b>     | 870     | 670 | 615   |
| Z-524544.01.ZL | 1               | 849              | <b>536,176</b> | 762,03  | 559 | 598   |
| Z-560507.ZL    | 2               | 815              | <b>536,176</b> | 762,03  | 559 | 598   |
| Z-532843.ZL    | 1               | 639              | <b>550</b>     | 740     | 510 | 600   |
| Z-517688.ZL    | 1               | 974              | <b>550</b>     | 800     | 560 | 610   |
| Z-517687.01.ZL | 1               | 1 100            | <b>560</b>     | 820     | 600 | 625   |
| Z-514444.ZL    | 1               | 1 020            | <b>571,1</b>   | 812,97  | 594 | 636   |

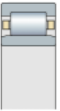
<sup>1)</sup> Bearing with four inner rings.





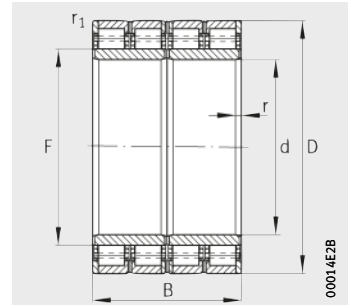
Design 2  
With solid brass cage

|          |                | Basic load ratings     |                          | Fatigue limit load |
|----------|----------------|------------------------|--------------------------|--------------------|
| r        | r <sub>1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub>    |
| min.     | min.           | kN                     | kN                       | kN                 |
| 12X20°   | 3              | 8 800                  | 18 000                   | 1 650              |
| 12X20°   | 3              | 9 500                  | 20 000                   | 1 820              |
| 5        | 3              | 10 000                 | 20 400                   | 1 880              |
| 5        | 2              | 8 150                  | 19 000                   | 1 760              |
| 5        | 4,5            | 16 000                 | 29 000                   | 2 550              |
| 12X20°   | 3              | 7 350                  | 14 300                   | 1 270              |
| 6        | 3              | 9 000                  | 18 300                   | 1 660              |
| 14X20°   | 2,5            | 10 400                 | 22 000                   | 2 000              |
| 15X20°   | 3              | 9 000                  | 19 600                   | 1 750              |
| 15X20°   | 3              | 9 800                  | 22 000                   | 1 970              |
| 15X20°   | 3              | 9 800                  | 19 300                   | 1 730              |
| 15X20°   | 2,5            | 11 600                 | 24 000                   | 2 170              |
| 6        | 4              | 12 200                 | 23 600                   | 2 110              |
| 6        | 6              | 11 200                 | 22 800                   | 2 060              |
| 15X20°   | 4              | 9 000                  | 22 800                   | 2 050              |
| 5        | 2              | 10 200                 | 22 800                   | 2 010              |
| 6        | 3              | 11 600                 | 25 000                   | 2 240              |
| 18X20°   | 5              | 11 200                 | 23 200                   | 2 080              |
| 17X20°   | 3              | 12 700                 | 27 500                   | 2 450              |
| 7,5      | 3              | 10 400                 | 25 500                   | 2 300              |
| 6        | 3              | 13 400                 | 28 000                   | 2 470              |
| 16X20°   | 3              | 14 600                 | 28 000                   | 2 430              |
| 6        | 3              | 13 700                 | 28 000                   | 2 450              |
| 8        | 3              | 12 000                 | 24 000                   | 2 080              |
| 12X20°   | 6              | 13 700                 | 29 000                   | 2 550              |
| 15X20°   | 2,5            | 14 600                 | 30 500                   | 2 650              |
| 7,5      | 5              | 21 200                 | 38 000                   | 3 200              |
| 18X20°   | 3              | 13 400                 | 30 000                   | 2 650              |
| 5        | 2              | 14 600                 | 31 500                   | 2 750              |
| 15X20°   | 2              | 12 200                 | 28 500                   | 2 490              |
| 18,5X20° | 4              | 15 000                 | 30 500                   | 2 600              |
| 20X20°   | 4              | 16 300                 | 33 500                   | 2 850              |
| 14X20°   | 4              | 16 000                 | 35 500                   | 3 000              |



# Cylindrical roller bearings

Four-row, with cylindrical bore,  
for tight fit on roll journals

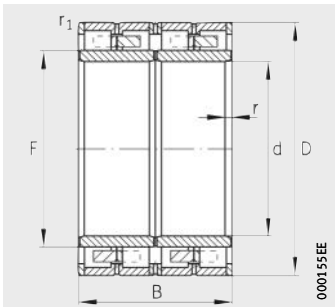


Design 1  
With pin cage

Dimension table (continued) · Dimensions in mm

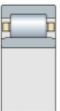
| Designation    | Design | Mass<br>m<br>≈kg | Dimensions     |           |                   |       |
|----------------|--------|------------------|----------------|-----------|-------------------|-------|
|                |        |                  | d              | D         | B                 | F     |
| Z-517685.ZL    | 1      | 1 260            | <b>580</b>     | 850       | 640               | 648   |
| Z-526413.ZL    | 2      | 605              | <b>585</b>     | 770       | 480               | 630   |
| Z-518780.ZL    | 1      | 886              | <b>600</b>     | 820       | 550               | 660   |
| Z-528518.ZL    | 1      | 936              | <b>600</b>     | 820       | 575               | 660   |
| Z-533259.ZL    | 1      | 1 110            | <b>600</b>     | 870       | 540               | 672   |
| Z-517684.01.ZL | 1      | 1 310            | <b>600</b>     | 870       | 640               | 672   |
| Z-561221.ZL    | 1      | 1 400            | <b>628</b>     | 922       | 600               | 702   |
| Z-515141.ZL    | 1      | 1 430            | <b>634,5</b>   | 901,87    | 674               | 705   |
| Z-515194.01.ZL | 1      | 1 470            | <b>650</b>     | 920       | 670               | 723   |
| Z-533258.ZL    | 1      | 827              | <b>670</b>     | 870       | 530               | 725   |
| Z-517682.ZL    | 1      | 1 610            | <b>670</b>     | 950       | 690               | 740   |
| Z-533683.ZL    | 1      | 1 290            | <b>680</b>     | 940       | 600               | 743   |
| Z-524229.ZL    | 1      | 1 640            | <b>680</b>     | 980       | 640               | 760   |
| Z-517681.ZL    | 1      | 1 800            | <b>690</b>     | 980       | 715               | 767,5 |
| Z-530487.ZL    | 1      | 1 210            | <b>700</b>     | 930       | 620               | 763   |
| Z-517680.01.ZL | 1      | 1 820            | <b>710</b>     | 1 000     | 715               | 787,5 |
| Z-522815.ZL    | 1      | 2 220            | <b>725</b>     | 1 040     | 750               | 809   |
| Z-525438.ZL    | 1      | 1 220            | <b>730</b>     | 960       | 620               | 790   |
| Z-517679.ZL    | 1      | 2 040            | <b>730</b>     | 1 030     | 750               | 809   |
| Z-524881.01.ZL | 1      | 1 500            | <b>750</b>     | 1 000     | 670               | 813   |
| F-800494.ZL    | 1      | 1 970            | <b>750</b>     | 1 090     | 615               | 836   |
| Z-524238.01.ZL | 1      | 2 360            | <b>761,425</b> | 1 079,6   | 787               | 846   |
| Z-540088.ZL    | 1      | 2 170            | <b>780</b>     | 1 070     | 780               | 853   |
| Z-517678.ZL    | 1      | 2 600            | <b>790</b>     | 1 120     | 810               | 875   |
| Z-526169.ZL    | 1      | 1 920            | <b>800</b>     | 1 080     | 700               | 878   |
| Z-524137.ZL    | 1      | 2 950            | <b>800</b>     | 1 150     | 850               | 888   |
| F-803317.ZL    | 1      | 2 480            | <b>820</b>     | 1 130     | 800               | 903   |
| Z-567729.ZL    | 1      | 1 720            | <b>830</b>     | 1 080     | 710               | 896   |
| Z-545636.ZL    | 1      | 2 580            | <b>850</b>     | 1 150     | 840               | 928   |
| Z-523397.ZL    | 1      | 3 570            | <b>850</b>     | 1 220     | 900               | 960   |
| Z-529054.ZL    | 1      | 1 900            | <b>860</b>     | 1 131,57  | 670               | 940   |
| Z-524239.01.ZL | 1      | 3 480            | <b>863</b>     | 1 219,302 | 889 <sup>1)</sup> | 956   |
| Z-566883.ZL    | 1      | 2 460            | <b>865</b>     | 1 180     | 750               | 945,3 |
| Z-523419.ZL    | 1      | 2 950            | <b>870</b>     | 1 180     | 880               | 950   |

<sup>1)</sup> Inner ring width 873,3 mm.



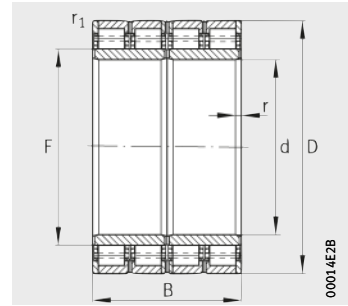
Design 2  
With solid brass cage

|        |                | Basic load ratings     |                          | Fatigue limit load |
|--------|----------------|------------------------|--------------------------|--------------------|
| r      | r <sub>1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub>    |
| min.   | min.           | kN                     | kN                       | kN                 |
| 20X20° | 4              | 18 000                 | 38 000                   | 3 200              |
| 5      | 2,5            | 11 600                 | 27 000                   | 2 340              |
| 6      | 3              | 14 000                 | 33 500                   | 2 800              |
| 15X20° | 3              | 15 000                 | 35 500                   | 3 050              |
| 22X20° | 4              | 15 300                 | 31 000                   | 2 550              |
| 20X20° | 3              | 18 300                 | 40 000                   | 3 300              |
| 18X20° | 6              | 19 000                 | 38 000                   | 3 050              |
| 20X15° | 3              | 20 400                 | 45 000                   | 3 700              |
| 18X20° | 4              | 20 800                 | 46 500                   | 3 800              |
| 6      | 3              | 13 700                 | 34 500                   | 2 900              |
| 18X20° | 4              | 22 400                 | 50 000                   | 4 000              |
| 7,5    | 4              | 19 000                 | 42 500                   | 3 400              |
| 20X20° | 4              | 21 200                 | 45 000                   | 3 550              |
| 20X20° | 4              | 22 800                 | 52 000                   | 4 150              |
| 18X20° | 3              | 17 000                 | 44 000                   | 3 650              |
| 22X20° | 4              | 23 200                 | 53 000                   | 4 250              |
| 7,5    | 3              | 25 500                 | 58 500                   | 4 600              |
| 20X20° | 3              | 17 600                 | 45 000                   | 3 650              |
| 20X20° | 6              | 25 500                 | 58 500                   | 4 600              |
| 20X20° | 3              | 20 400                 | 50 000                   | 4 000              |
| 7,5    | 7,5            | 21 600                 | 43 000                   | 3 300              |
| 22X20° | 5              | 28 000                 | 63 000                   | 4 900              |
| 7,5    | 5              | 26 500                 | 64 000                   | 5 100              |
| 7,5    | 4              | 30 000                 | 69 500                   | 5 400              |
| 25X20° | 3              | 22 800                 | 58 500                   | 4 500              |
| 9,5    | 9,5            | 31 000                 | 69 500                   | 5 300              |
| 7,5    | 7,5            | 27 000                 | 67 000                   | 4 900              |
| 20X20° | 2,5            | 22 800                 | 61 000                   | 4 750              |
| 23X20° | 4              | 30 500                 | 76 500                   | 5 800              |
| 23X20° | 5              | 36 000                 | 85 000                   | 6 400              |
| 7,5    | 4              | 23 200                 | 60 000                   | 6 400              |
| 13X20° | 5              | 34 500                 | 85 000                   | 6 400              |
| 20X20° | 8,5            | 27 500                 | 64 000                   | 4 900              |
| 8      | 8              | 32 000                 | 81 500                   | 6 100              |



# Cylindrical roller bearings

Four-row, with cylindrical bore,  
for tight fit on roll journals

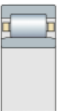


Design 1  
With pin cage

Dimension table (continued) · Dimensions in mm

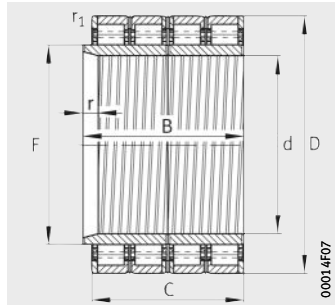
| Designation    | Design | Mass<br>m<br>≈kg | Dimensions   |          |       |         |
|----------------|--------|------------------|--------------|----------|-------|---------|
|                |        |                  | d            | D        | B     | F       |
| Z-527048.ZL    | 1      | 2 950            | <b>900</b>   | 1 220    | 840   | 989     |
| Z-541812.ZL    | 1      | 3 950            | <b>900</b>   | 1 280    | 930   | 1 000   |
| Z-527977.ZL    | 1      | 3 130            | <b>937,5</b> | 1 270,25 | 826   | 1 027   |
| Z-517676.ZL    | 1      | 4 380            | <b>940</b>   | 1 320    | 1 000 | 1 029   |
| Z-517369.01.ZL | 1      | 5 030            | <b>950</b>   | 1 360    | 1 000 | 1 075   |
| Z-580309.ZL    | 1      | 3 450            | <b>980</b>   | 1 310    | 880   | 1 061,7 |
| Z-517740.ZL    | 1      | 4 670            | <b>980</b>   | 1 360    | 1 000 | 1 080   |
| Z-522071.ZL    | 1      | 3 270            | <b>990</b>   | 1 360    | 760   | 1 080   |
| Z-527021.ZL    | 1      | 3 520            | <b>1 000</b> | 1 360    | 800   | 1 101   |
| Z-517675.ZL    | 1      | 5 070            | <b>1 040</b> | 1 440    | 1 000 | 1 133   |
| Z-521910.ZL    | 1      | 3 010            | <b>1 060</b> | 1 360    | 800   | 1 137   |
| Z-517737.ZL    | 1      | 5 300            | <b>1 100</b> | 1 500    | 1 000 | 1 194   |
| Z-518206.ZL    | 1      | 3 620            | <b>1 150</b> | 1 500    | 760   | 1 240   |
| Z-518649.ZL    | 1      | 5 790            | <b>1 200</b> | 1 590    | 1 050 | 1 305   |
| Z-518578.ZL    | 1      | 7 010            | <b>1 200</b> | 1 620    | 1 150 | 1 305   |
| Z-528717.ZL    | 1      | 9 470            | <b>1 400</b> | 1 900    | 1 150 | 1 520   |
| Z-534900.ZL    | 1      | 9 880            | <b>1 500</b> | 1 950    | 1 230 | 1 610   |

|        |                | Basic load ratings     |                          | Fatigue limit load |
|--------|----------------|------------------------|--------------------------|--------------------|
| r      | r <sub>1</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | C <sub>ur</sub>    |
| min.   | min.           | kN                     | kN                       | kN                 |
| 24X20° | 4              | 31 500                 | 80 000                   | 6 000              |
| 6      | 3              | 36 500                 | 85 000                   | 6 300              |
| 25X20° | 4              | 32 000                 | 80 000                   | 5 900              |
| 7,5    | 4              | 41 500                 | 98 000                   | 7 200              |
| 9,5    | 5              | 44 000                 | 108 000                  | 7 900              |
| 20X20° | 6              | 35 500                 | 93 000                   | 6 900              |
| 25X20° | 5              | 41 500                 | 106 000                  | 7 800              |
| 12     | 6              | 30 500                 | 68 000                   | 4 900              |
| 25X20° | 3              | 34 000                 | 83 000                   | 6 000              |
| 20X20° | 5              | 45 000                 | 106 000                  | 7 600              |
| 18X20° | 5              | 32 500                 | 91 500                   | 6 500              |
| 7,5    | 4              | 46 500                 | 114 000                  | 8 000              |
| 20X20° | 5              | 33 500                 | 86 500                   | 6 100              |
| 30X20° | 6              | 47 500                 | 129 000                  | 8 900              |
| 9,5    | 9,5            | 56 000                 | 146 000                  | 10 200             |
| 40X20° | 10             | 64 000                 | 156 000                  | 10 200             |
| 9,5    | 6              | 71 000                 | 200 000                  | 13 000             |

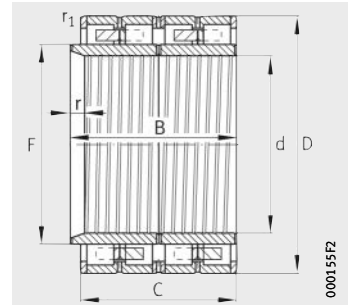


# Cylindrical roller bearings

Four-row,  
with cylindrical bore,  
for loose fit on roll journals



Design 6  
With pin cage



Design 7  
With solid brass cage

**Dimension table** - Dimensions in mm

| Designation | Design            | Mass<br>m<br>≈kg | Dimensions |     |     |     |
|-------------|-------------------|------------------|------------|-----|-----|-----|
|             |                   |                  | d          | D   | B   | C   |
| Z-580510.ZL | 9 <sup>1)2)</sup> | 100              | <b>220</b> | 340 | 320 | 290 |
| F-801076.ZL | 9                 | 86,5             | <b>250</b> | 350 | 320 | 290 |
| Z-536897.ZL | 7 <sup>3)</sup>   | 79,4             | <b>260</b> | 370 | 240 | 220 |
| Z-522009.ZL | 8 <sup>4)</sup>   | 102              | <b>270</b> | 380 | 295 | 275 |
| Z-533575.ZL | 8                 | 82,9             | <b>280</b> | 390 | 240 | 220 |
| Z-532504.ZL | 7                 | 134              | <b>300</b> | 420 | 320 | 300 |
| Z-580511.ZL | 9 <sup>2)</sup>   | 160              | <b>320</b> | 440 | 370 | 340 |
| Z-531839.ZL | 7                 | 211              | <b>340</b> | 480 | 370 | 350 |
| Z-580512.ZL | 9 <sup>2)4)</sup> | 267              | <b>340</b> | 500 | 410 | 370 |
| Z-538977.ZL | 6 <sup>2)</sup>   | 246              | <b>350</b> | 500 | 400 | 380 |
| F-801476.ZL | 7                 | 225              | <b>350</b> | 520 | 320 | 300 |
| Z-533808.ZL | 7                 | 244              | <b>360</b> | 510 | 400 | 380 |
| F-801082.ZL | 9                 | 258              | <b>370</b> | 520 | 410 | 380 |
| Z-522007.ZL | 6                 | 290              | <b>380</b> | 540 | 400 | 380 |
| Z-565463.ZL | 7                 | 286              | <b>380</b> | 540 | 400 | 380 |
| Z-536713.ZL | 6                 | 306              | <b>380</b> | 540 | 420 | 400 |
| F-803580.ZL | 9 <sup>1)5)</sup> | 232              | <b>390</b> | 540 | 350 | 320 |
| Z-561270.ZL | 7                 | 280              | <b>410</b> | 560 | 420 | 400 |
| Z-561269.ZL | 6                 | 293              | <b>410</b> | 560 | 420 | 400 |
| Z-533022.ZL | 6                 | 245              | <b>430</b> | 570 | 360 | 340 |
| Z-579578.ZL | 6                 | 398              | <b>440</b> | 620 | 430 | 410 |
| Z-572891.ZL | 6                 | 434              | <b>440</b> | 620 | 450 | 450 |
| Z-561271.ZL | 7                 | 428              | <b>440</b> | 620 | 470 | 450 |
| Z-533578.ZL | 6                 | 438              | <b>440</b> | 620 | 470 | 450 |
| F-808290.ZL | 9 <sup>1)5)</sup> | 444              | <b>440</b> | 620 | 485 | 450 |
| Z-532465.ZL | 6 <sup>2)</sup>   | 500              | <b>460</b> | 650 | 470 | 470 |
| Z-536712.ZL | 6 <sup>6)</sup>   | 513              | <b>460</b> | 650 | 490 | 470 |
| Z-567014.ZL | 6                 | 526              | <b>460</b> | 680 | 410 | 410 |
| Z-524081.ZL | 6                 | 322              | <b>480</b> | 620 | 420 | 400 |
| Z-533487.ZL | 6                 | 439              | <b>480</b> | 650 | 450 | 450 |

1) With rib washers.

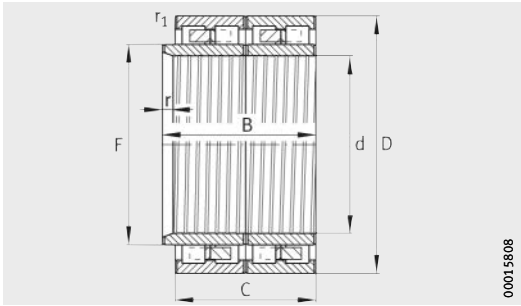
2) Chamfer distance instead of inner ring bevel.

3) Single-piece inner ring.

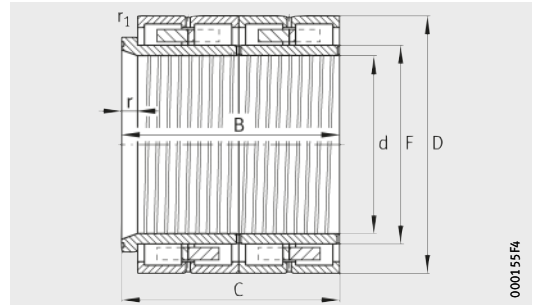
4) Circumferential lubrication groove and lubrication holes in the outer rings.

5) With pin cages.

6) Without helical groove in bearing bore.

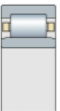


Design 8  
With solid brass cage



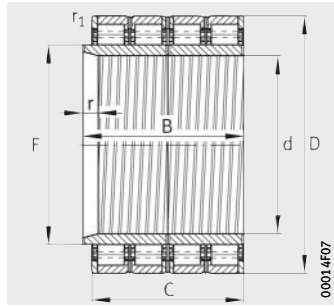
Design 9  
With solid brass cage

| F   | r        | r <sub>1</sub> | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ur</sub><br>kN |
|-----|----------|----------------|------------------------------|--------------------------------|---|
|     |          |                | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |   |
| 250 | 3        | 2              | 3 550                        | 5 850                          | 640   |
| 277 | 28X20°   | 3              | 3 100                        | 6 000                          | 650   |
| 292 | 15X20°   | 2,5            | 2 200                        | 4 050                          | 430   |
| 300 | 15,5X15° | 2,1            | 3 550                        | 6 800                          | 720   |
| 312 | 17X20°   | 3              | 2 280                        | 4 300                          | 450   |
| 332 | 15X20°   | 2              | 4 150                        | 8 000                          | 820   |
| 350 | 4        | 1,5            | 4 650                        | 9 500                          | 950   |
| 378 | 15X20°   | 1,5            | 5 300                        | 11 000                         | 1 100                                       |
| 385 | 6        | 3              | 5 850                        | 11 200                         | 1 110                                       |
| 388 | 6        | 3              | 6 550                        | 13 200                         | 1 280                                       |
| 401 | 28X20°   | 5              | 5 100                        | 8 800                          | 830   |
| 399 | 28X15°   | 2              | 6 100                        | 11 800                         | 1 150                                       |
| 409 | 30X20°   | 1,5            | 6 100                        | 11 800                         | 1 150                                       |
| 424 | 35X15°   | 1,5            | 6 700                        | 13 700                         | 1 300                                       |
| 422 | 20X20°   | 1,5            | 6 700                        | 13 200                         | 1 250                                       |
| 422 | 34X15°   | 2              | 7 100                        | 15 000                         | 1 430                                       |
| 431 | 10X20°   | 2              | 5 500                        | 11 000                         | 1 100                                       |
| 450 | 32X15°   | 2              | 6 700                        | 13 700                         | 1 300                                       |
| 450 | 30X15°   | 2              | 7 500                        | 16 000                         | 1 520                                       |
| 465 | 35X15°   | 5              | 6 200                        | 13 200                         | 1 230                                       |
| 487 | 12X20°   | 2              | 8 650                        | 17 600                         | 1 590                                       |
| 487 | 12X20°   | 3              | 9 500                        | 20 000                         | 1 820                                       |
| 487 | 32X20°   | 3              | 9 300                        | 19 300                         | 1 760                                       |
| 487 | 30X20°   | 3              | 9 500                        | 20 000                         | 1 820                                       |
| 487 | 44X10,3° | 3              | 9 500                        | 20 000                         | 1 820                                       |
| 509 | 6        | 2,5            | 10 400                       | 22 000                         | 2 000                                       |
| 509 | 34X15°   | 2,5            | 10 400                       | 22 000                         | 2 000                                       |
| 516 | 14X20°   | 2,5            | 9 800                        | 18 300                         | 1 650                                       |
| 515 | 4        | 2              | 7 800                        | 18 300                         | 1 680                                       |
| 525 | 12,5X20° | 3              | 9 800                        | 22 000                         | 1 970                                       |

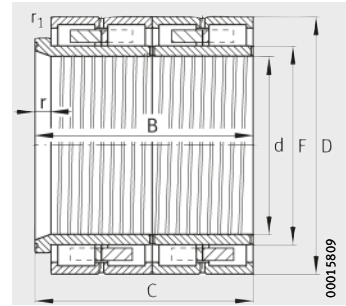


# Cylindrical roller bearings

Four-row,  
with cylindrical bore,  
for loose fit on roll journals



Design 6  
With pin cage



Design 9  
With solid brass cage

**Dimension table** (continued) · Dimensions in mm

| Designation | Design            | Mass<br>m<br>≈kg | Dimensions     |        |     |       |
|-------------|-------------------|------------------|----------------|--------|-----|-------|
|             |                   |                  | d              | D      | B   | C     |
| Z-540386.ZL | 6                 | 459              | <b>500</b>     | 670    | 450 | 450   |
| Z-564182.ZL | 6                 | 454              | <b>500</b>     | 670    | 470 | 450   |
| Z-579713.ZL | 9 <sup>1)2)</sup> | 809              | <b>530</b>     | 760    | 555 | 520   |
| Z-566466.ZL | 6                 | 845              | <b>536,176</b> | 762,03 | 559 | 558,8 |
| Z-579741.ZL | 6                 | 645              | <b>550</b>     | 740    | 527 | 510   |
| Z-532470.ZL | 6 <sup>3)</sup>   | 1 160            | <b>570</b>     | 830    | 630 | 600   |
| Z-572176.ZL | 6                 | 1 020            | <b>571,1</b>   | 812,97 | 594 | 594   |
| Z-565652.ZL | 6                 | 942              | <b>600</b>     | 820    | 575 | 575   |
| Z-572137.ZL | 9                 | 1 260            | <b>600</b>     | 870    | 578 | 540   |

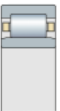
1) With pin cages.

2) With rib washers.

3) Without helical groove in bearing bore.

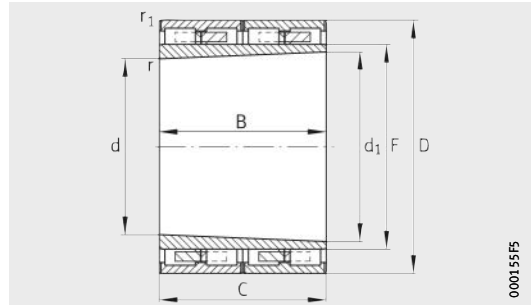


| F   | r<br>min. | r <sub>1</sub><br>min. | Basic load ratings           |                                | Fatigue limit load    |
|-----|-----------|------------------------|------------------------------|--------------------------------|-----------------------|
|     |           |                        | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | C <sub>ur</sub><br>kN |
| 540 | 13X20°    | 5                      | 9 500                        | 21 200                         | 1 880                 |
| 540 | 34X15°    | 4                      | 9 500                        | 21 600                         | 1 900                 |
| 587 | 45X12,5°  | 2,5                    | 13 700                       | 29 000                         | 2 550                 |
| 598 | 18X20°    | 4                      | 13 400                       | 30 000                         | 2 650                 |
| 600 | 15X20°    | 2                      | 12 200                       | 28 500                         | 2 490                 |
| 635 | 35X15°    | 4                      | 16 600                       | 34 500                         | 2 950                 |
| 636 | 15X20°    | 5                      | 16 000                       | 35 500                         | 3 000                 |
| 660 | 15X20°    | 3                      | 15 000                       | 35 500                         | 3 050                 |
| 672 | 53X12°    | 4                      | 15 300                       | 31 000                         | 2 550                 |



# Cylindrical roller bearings

Four-row, with tapered bore  
(taper 1:12)



Design 10

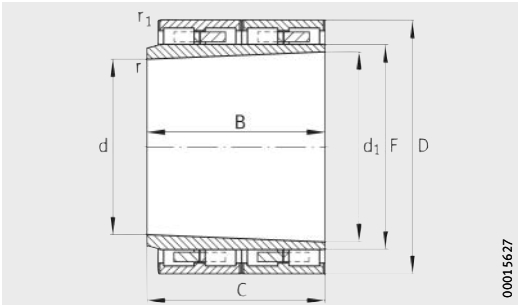
**Dimension table** - Dimensions in mm

| Designation           | Design             | Mass<br>m<br>≈kg | Dimensions     |                |     |     |
|-----------------------|--------------------|------------------|----------------|----------------|-----|-----|
|                       |                    |                  | d              | d <sub>1</sub> | D   | B   |
| <b>Z-506743.01.ZL</b> | 10                 | 57,1             | <b>230</b>     | 248,333        | 330 | 220 |
| <b>Z-500857.01.ZL</b> | 11                 | 58,8             | <b>231</b>     | 249,333        | 330 | 220 |
| <b>Z-507518.ZL</b>    | 10                 | 121              | <b>260</b>     | 283,75         | 400 | 285 |
| <b>Z-522518.01.ZL</b> | 10                 | 109              | <b>260</b>     | 280,833        | 400 | 250 |
| <b>Z-505356.ZL</b>    | 12                 | 211              | <b>320</b>     | 349,167        | 480 | 350 |
| <b>Z-510302.01.ZL</b> | 12                 | 328              | <b>356,667</b> | 390            | 550 | 400 |
| <b>Z-527181.ZL</b>    | 10 <sup>1)2)</sup> | 580              | <b>412,335</b> | 453,002        | 650 | 488 |
| <b>Z-538221.ZL</b>    | 10 <sup>2)3)</sup> | 382              | <b>440</b>     | 469,583        | 650 | 355 |
| <b>Z-527388.ZL</b>    | 12 <sup>3)</sup>   | 806              | <b>485</b>     | 530            | 740 | 540 |
| <b>Z-577938.ZL</b>    | 12 <sup>3)</sup>   | 803              | <b>485</b>     | 530            | 740 | 540 |

1) Circumferential lubrication groove and lubrication holes in the outer rings.

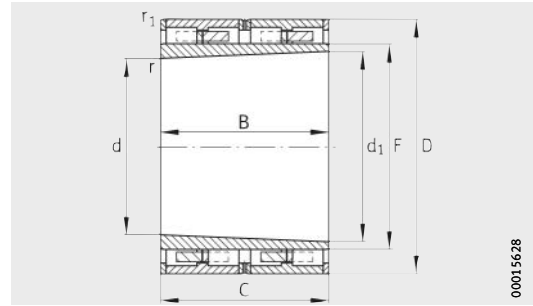
2) Without lubrication grooves in the end faces of the outer rings.

3) With pin cage.



00015627

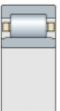
Design 11

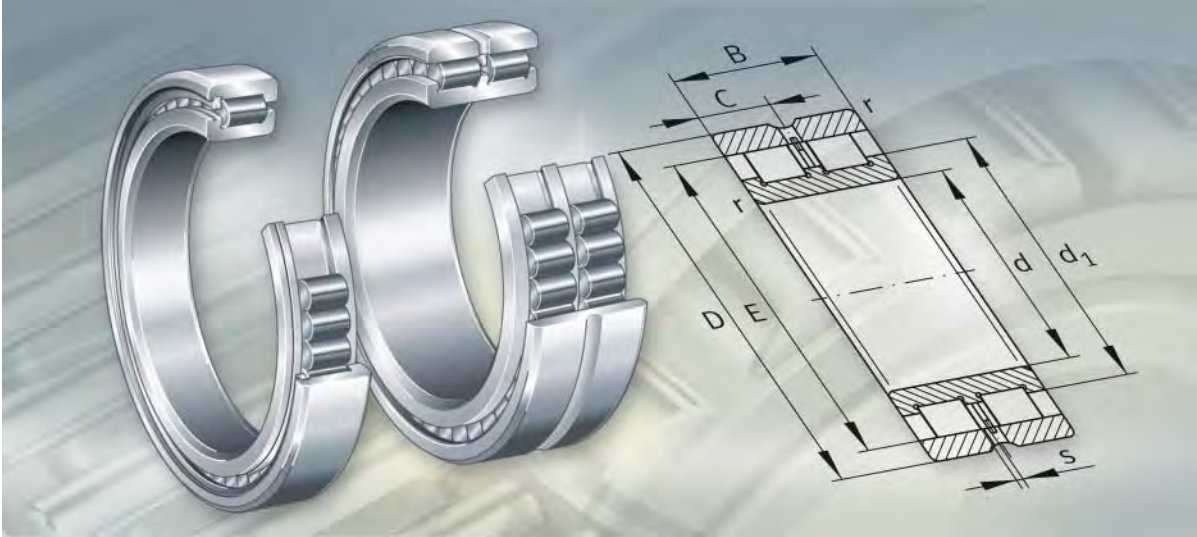


00015628

Design 12

| C   | F     | r<br>min. | r <sub>1</sub><br>min. | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ur</sub><br>kN |
|-----|-------|-----------|------------------------|------------------------------|--------------------------------|---|
|     |       |           |                        | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |   |
| 220 | 266   | 2,1       | 1                      | 2 200                        | 4 250                          | 455   |
| 235 | 270   | 1,5       | 2                      | 2 080                        | 4 250                          | 460   |
| 285 | 316   | 4         | 1,5                    | 3 400                        | 6 300                          | 650   |
| 250 | 310   | 1,5       | 3                      | 3 000                        | 5 400                          | 550   |
| 350 | 378   | 1,5       | 1,5                    | 5 400                        | 11 200                         | 1 090                                       |
| 400 | 423,4 | 2,5       | 4                      | 6 700                        | 13 400                         | 1 270                                       |
| 488 | 494,5 | 4         | 1,5                    | 9 650                        | 18 600                         | 1 720                                       |
| 355 | 509,5 | 6         | 3                      | 8 800                        | 17 600                         | 1 600                                       |
| 540 | 572   | 3         | 5                      | 13 200                       | 27 500                         | 2 410                                       |
| 540 | 572,3 | 5         | 5                      | 13 200                       | 27 500                         | 2 410                                       |

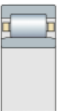




**Full complement cylindrical roller bearings**

# Full complement cylindrical roller bearings

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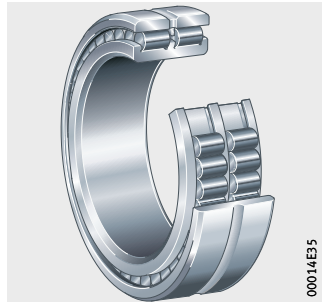


# Product overview Full complement cylindrical roller bearings

## Non-locating bearings

Double row

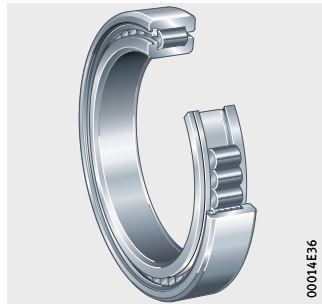
SL0248, SL0249



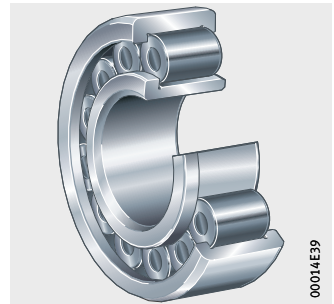
## Semi-locating bearings

Single row

SL1818, SL1829,  
SL1830, SL1822

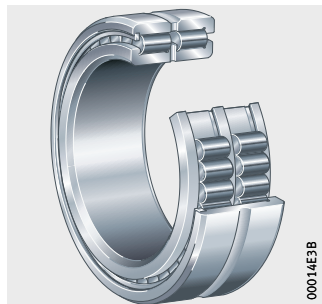


SL1923



Double row

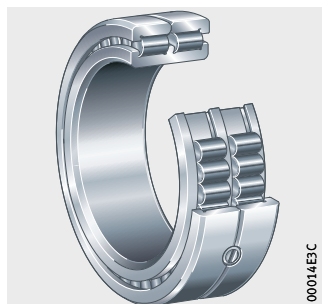
SL1850



## Locating bearings

Double row, open  
Cable sheave bearings, sealed

SL0148, SL0149



SL0450..-PP, SL04..-PP



# Full complement cylindrical roller bearings

**Features** Full complement cylindrical roller bearings comprise solid outer and inner rings and rib-guided cylindrical rollers. Since these bearings have the largest possible number of rolling elements, they have extremely high radial load carrying capacity, high rigidity and are suitable for particularly compact designs. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage. Single row full complement cylindrical roller bearings are available as non-locating, semi-locating and locating bearings.

**Bearings of TB design** In the case of bearings of TB design, the axial load carrying capacity of cylindrical roller bearings was significantly improved with the aid of new calculation and manufacturing methods. A special curvature on the end faces of the rollers ensures optimum contact conditions between roller and rib. As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces are completely eliminated. In addition, axial torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

**Non-locating bearings** Bearings SL0248 (designation to DIN 5 412-9: NNCL 48..V) and bearings SL0249 (designation to DIN 5 412-9: NNCL 49..V) are double row non-locating bearings and can support radial forces only.

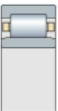


The bearings are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

**Axial displacement** The outer ring without ribs can be axially displaced in both directions in relation to the inner ring. The inner ring has ribs on both sides.

**Sealing** The cylindrical roller bearings are of an open design.

**Lubrication** The bearings can be lubricated with oil or grease. For lubrication, the outer ring has a lubrication groove and lubrication holes.



# Full complement cylindrical roller bearings

## Semi-locating bearings

Semi-locating bearings are available in a single row design as SL1818 (dimension series 18), SL1829 (dimension series 29), SL1830 (dimension series 30), SL1822 (dimension series 22) and SL1923 (dimension series 23). Bearings of series SL1850 (dimension series 50) are of a double row design.

They can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.

Series SL1923 has only one rib on the inner ring and a self-retaining rolling element set. As a result, the inner ring can be removed from the bearing. As a result, mounting and dismounting is considerably easier.



The bearings SL1818, SL1829, SL1830, SL1822 and SL1850 are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

## Axial displacement of the inner ring

The inner ring can be axially displaced in one direction by the dimension “s”, see dimension table.

## Sealing

The cylindrical roller bearings are supplied in an open design.

## Lubrication

The single row bearings can be lubricated via the end faces with oil or grease.

## Locating bearings

Bearings SL0148 (designation to DIN 5 412-9: NNC 48..V) and bearings SL0149 (designation to DIN 5 412-9: NNC 49..V) are double row locating bearings. These bearings can support axial forces in both directions as well as radial forces.



The outer ring has ribs on both sides, is axially split and held together by retaining rings. The inner ring has an additional central rib. The retaining rings must not be subjected to axial load.

## Cable sheave bearings

Cable sheave bearings (cylindrical roller bearings with annular slots) are locating bearings. These bearings are very rigid and can support moderate axial forces in both directions as well as high radial forces. They comprise solid outer and inner rings with ribs, rib-guided cylindrical rollers and sealing rings.

The outer rings have annular slots for retaining rings. The inner rings are axially split, 1 mm wider than the outer rings and held together by a rolled-in steel strip.

Cylindrical roller bearings with annular slots are available as a light series SL04..-PP and in the dimension series 50 as SL0450..-PP.



**Sealing** In the case of cable sheave bearings, the rolling element system is protected against contamination and moisture by sealing rings on both sides.

**Lubrication** Open locating bearings can be lubricated with oil or grease. For lubrication, the outer ring has a lubrication groove and lubrication holes.  
Cable sheave bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the outer or inner ring. Arcanol LOAD150 is suitable for relubrication.

**Operating temperature** Open full complement cylindrical roller bearings are suitable for operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ .

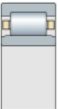


Cylindrical roller bearings with annular slots are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+80\text{ }^{\circ}\text{C}$ , restricted by the grease and seal material.

**Suffixes** Suffixes for available designs: see table.

**Available designs**

| Suffix | Description   | Design                                      |
|--------|---|---|
| BR     | Black oxide coated  | Special design, available by agreement only |
| C3     | Radial internal clearance larger than normal                            |   |
| C4     | Radial internal clearance larger than C3                                |   |
| C5     | Radial internal clearance larger than C4                                |   |
| E      | Increased capacity design   |   |
| P      | Seal on one side  | Standard                                    |
| PP     | Seals on both sides   |   |
| RR     | Corrosion-resistant design, with Corrotect® coating                     | Special design, available by agreement only |
| 2NR    | Cable sheave bearing supplied with two loose-packed retaining rings WRE |   |
| –      | Without seals   |   |
| TB     | Bearing with increased axial load carrying capacity                     |   |



**Available bearings of TB design**

| Series available by agreement | From bore diameter<br>d<br>mm |
|-------------------------------|-------------------------------|
| SL1818                        | 460                           |
| SL1822                        | 180                           |
| SL1829                        | 300                           |
| SL1830                        | 240                           |
| SL1923                        | 150                           |
| SL1850                        | 300                           |

# Full complement cylindrical roller bearings

## Design and safety guidelines

### Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

- 4' in bearings of series SL1818
- 3' in bearings of series SL1923, SL1822, SL1829, SL1830.

Double row bearings do not permit any skewing between the inner and outer ring.

### Axial load carrying capacity

Radial cylindrical roller bearings used as semi-locating and locating bearings can support axial forces in one or both directions in addition to radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication of the contact surfaces
- tilting of the bearings (in single row bearings).



Ribs subjected to load must be supported across their entire height.

The permissible axial load  $F_{a\ per}$  must not be exceeded in order to avoid an unacceptable increase in temperature.

The axial limiting load  $F_{a\ max}$  must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio  $F_a/F_r$  must not exceed the value 0,4.

In the case of bearings of TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

**Permissible and maximum load**

The axial load  $F_{a\ per}$  and the limiting load  $F_{a\ max}$  are calculated according to the following equations.

**Bearings in standard design**

$$F_{a\ per} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\ max}$$

**Bearings of TB design**

$$F_{a\ per} = 1,5 \cdot k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\ max}$$

**Bearings of standard and TB design**

$$F_{a\ max} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

- $F_{a\ per}$  N  
Permissible axial load
- $F_{a\ max}$  N  
Axial limiting load
- $k_S$  –  
Factor as a function of the lubrication method, see table
- $k_B$  –  
Factor as a function of the bearing series, see table, page 450
- $d_M$  mm  
Mean bearing diameter  $(d + D)/2$ , see dimension table
- $n$  min<sup>-1</sup>  
Operating speed.

**Cable sheave bearings**

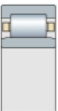


In the case of cylindrical roller bearings with annular slots, application engineering advice is necessary. The limit values and calculations for  $F_{a\ per}$  and  $F_{a\ max}$  are not therefore valid for these bearings.

**Factor  $k_S$   
for the lubrication method**

| Lubrication method <sup>1)</sup>   | Factor $k_S$ |
|--|--------------|
| Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ( $\nu < 0,5 \cdot \nu_1$ ) | 7,5 to 10    |
| Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow   | 10 to 15     |
| Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)   | 12 to 18     |
| Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ( $\nu > 2 \cdot \nu_1$ ) | 16 to 24     |

<sup>1)</sup> Doped oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.



# Full complement cylindrical roller bearings

## Bearing factor $k_B$

| Series         | Factor $k_B$ |
|----------------|--------------|
| SL1818, SL0148 | 4,5          |
| SL1829, SL0149 | 11           |
| SL1830, SL1850 | 17           |
| SL1822         | 20           |
| SL1923         | 30           |

## Equivalent dynamic bearing load

### Non-locating bearings and cable sheave bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

### Semi-locating and locating bearings

If an axial force  $F_a$  is present in addition to the radial force  $F_r$ , the load ratio must be taken into consideration.

### Load ratio and equivalent dynamic load

| Load ratio               | Equivalent dynamic load            |
|--------------------------|------------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r$                          |
| $\frac{F_a}{F_r} > e$    | $P = 0,92 \cdot F_r + Y \cdot F_a$ |

$P$  kN

Equivalent dynamic bearing load for combined load

$F_a$  kN

Axial dynamic bearing load

$F_r$  kN

Radial dynamic bearing load

$e, Y$  -

Factors, see table.

## Factors $e$ and $Y$

| Series                         | Calculation factors |     |
|--------------------------------|---------------------|-----|
|                                | $e$                 | $Y$ |
| SL1818, SL1850                 | 0,2                 | 0,6 |
| SL0148, SL0149                 | 0,4                 | 0,5 |
| SL1822, SL1829, SL1830, SL1923 | 0,3                 | 0,4 |

### Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0r}$  kN  
Radial static bearing load.

### Minimum radial load



In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{0r}/60$  is necessary.

If  $F_{r \min} < C_{0r}/60$ , please contact us.

### Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

### Cable sheave bearings

Cable sheave bearings are normally subjected to circumferential load on the outer ring. The outer ring must therefore have a press fit.

### Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force locking or form fit.

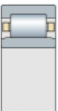
The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating point to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum values for the chamfer dimensions  $r$  in the dimension tables must be observed.

For semi-locating bearings, the bearings only require support on one side, on the rib supporting the axial load.

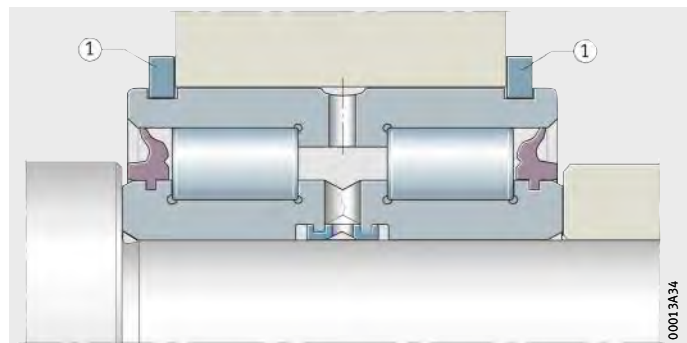


In axially loaded bearings, full support must be provided for the ribs transmitting forces, *Figure 1*.



① Retaining ring

*Figure 1*  
Axial location of outer and inner ring, support of ribs



00013A34

# Full complement cylindrical roller bearings

## Location of cable sheave bearings

The annular slots allow axial location of the outer rings using retaining rings, *Figure 1*, page 451. Rings of series WRE or rings to DIN 471 are suitable. Locating rings are not included in the delivery. In the design 2NR, the delivery includes two retaining rings WRE packed loose.



The split inner ring must be axially secured, *Figure 1*, page 451. The fasteners must not be subjected to axial load.

## Support of sealing rings

The sealing rings must be supported to a sufficient height, so that they are not pressed out during lubrication of the bearings, *Figure 2*. The dimension  $d_2$  must be observed, see dimension table.

① Sealing ring

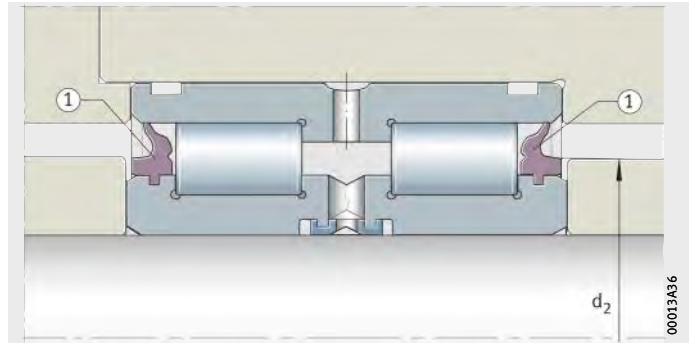
*Figure 2*

Support of sealing rings

## Mounting and dismounting of cable sheave bearings



During mounting and dismounting of the bearings, the mounting forces must never be directed through the rolling elements, sealing rings or the fasteners on the split inner ring.



**Accuracy** The dimensional and running tolerances of the bearings correspond to tolerance class PN to DIN 620.

**Radial internal clearance** The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

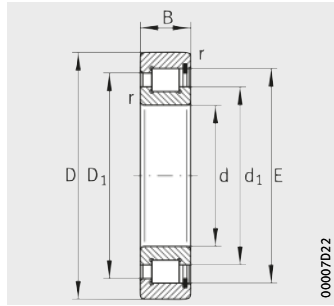
**Radial internal clearance**

| Bore    |       | Radial internal clearance |      |          |      |          |      |          |      |
|---------|-------|---------------------------|------|----------|------|----------|------|----------|------|
| d<br>mm |       | CN<br>μm                  |      | C3<br>μm |      | C4<br>μm |      | C5<br>μm |      |
| over    | incl. | min.                      | max. | min.     | max. | min.     | max. | min.     | max. |
| 200     | 225   | 105                       | 165  | 160      | 220  | 220      | 280  | 305      | 365  |
| 225     | 250   | 110                       | 175  | 170      | 235  | 235      | 300  | 330      | 395  |
| 250     | 280   | 125                       | 195  | 190      | 260  | 260      | 330  | 370      | 440  |
| 280     | 315   | 130                       | 205  | 200      | 275  | 275      | 350  | 410      | 485  |
| 315     | 355   | 145                       | 225  | 225      | 305  | 305      | 385  | 455      | 535  |
| 355     | 400   | 190                       | 280  | 280      | 370  | 370      | 460  | 510      | 600  |
| 400     | 450   | 210                       | 310  | 310      | 410  | 410      | 510  | 565      | 665  |
| 450     | 500   | 220                       | 330  | 330      | 440  | 440      | 550  | 625      | 735  |

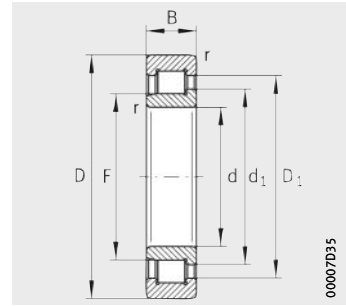


# Single row full complement cylindrical roller bearings

Semi-locating bearings



SL1818, SL1829, SL1830, SL1822

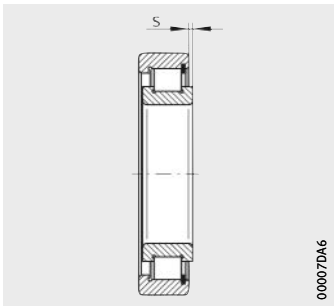


SL1923

Dimension table - Dimensions in mm

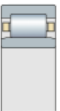
| Designation | Mass<br>m<br>≈kg | Dimensions |     |     |           |                 |        |                     |
|-------------|------------------|------------|-----|-----|-----------|-----------------|--------|---------------------|
|             |                  | d          | D   | B   | r<br>min. | s <sup>1)</sup> | F      | d <sub>1</sub><br>≈ |
| SL192330-TB | 42,1             | 150        | 320 | 108 | 4         | 7               | 182,49 | 203,3               |
| SL192332-TB | 49,7             | 160        | 340 | 114 | 4         | 7               | 196,38 | 219                 |
| SL192334-TB | 59,2             | 170        | 360 | 120 | 4         | 7               | 203,55 | 226,6               |
| SL182236    | 29,8             | 180        | 320 | 86  | 4         | 7               | -      | 232,4               |
| SL192336-TB | 69,1             | 180        | 380 | 126 | 4         | 7               | 221,56 | 245                 |
| SL182238    | 35,65            | 190        | 340 | 92  | 4         | 9               | -      | 243,5               |
| SL192338-TB | 80,3             | 190        | 400 | 132 | 5         | 7               | 224,43 | 250                 |
| SL182240    | 43,12            | 200        | 360 | 98  | 4         | 9               | -      | 246,6               |
| SL192340-TB | 92,1             | 200        | 420 | 138 | 5         | 7               | 238,45 | 265,7               |
| SL183044    | 28,4             | 220        | 340 | 90  | 3         | 9               | -      | 254,6               |
| SL192344-TB | 111,2            | 220        | 460 | 145 | 5         | 7               | 266,71 | 297                 |
| SL182948    | 10,6             | 240        | 320 | 48  | 2,1       | 3               | -      | 267,5               |
| SL183048    | 30,9             | 240        | 360 | 92  | 3         | 11              | -      | 277,5               |
| SL192348-TB | 142,3            | 240        | 500 | 155 | 5         | 10              | 280,55 | 312,5               |
| SL181852-E  | 4,61             | 260        | 320 | 28  | 2         | 2               | -      | 281                 |
| SL182952    | 18,5             | 260        | 360 | 60  | 2,1       | 5               | -      | 291,5               |
| SL183052    | 44,5             | 260        | 400 | 104 | 4         | 11              | -      | 304                 |
| SL192352-TB | 173,2            | 260        | 540 | 165 | 6         | 10              | 315,6  | 351,6               |
| SL181856-E  | 6,89             | 280        | 350 | 33  | 2         | 2,5             | -      | 304                 |
| SL182956    | 19,7             | 280        | 380 | 60  | 2,1       | 3,5             | -      | 314                 |
| SL183056    | 48               | 280        | 420 | 106 | 4         | 11              | -      | 319,5               |
| SL181860-E  | 9,79             | 300        | 380 | 38  | 2,1       | 3               | -      | 323,5               |
| SL182960    | 31,2             | 300        | 420 | 72  | 3         | 5               | -      | 338                 |
| SL183060-TB | 66,6             | 300        | 460 | 118 | 4         | 14              | -      | 353,6               |
| SL181864-E  | 10,36            | 320        | 400 | 38  | 2,1       | 3               | -      | 344,5               |
| SL182964    | 32,9             | 320        | 440 | 72  | 3         | 5               | -      | 358,5               |
| SL183064-TB | 71,7             | 320        | 480 | 121 | 4         | 14              | -      | 369,5               |
| SL181868-E  | 10,93            | 340        | 420 | 38  | 2,1       | 3               | -      | 365,5               |
| SL182968    | 34,7             | 340        | 460 | 72  | 3         | 5               | -      | 379                 |
| SL183068-TB | 95,8             | 340        | 520 | 133 | 5         | 16              | -      | 396,1               |
| SL181872-E  | 11,49            | 360        | 440 | 38  | 2,1       | 3               | -      | 387                 |
| SL182972    | 36,4             | 360        | 480 | 72  | 3         | 5               | -      | 399,5               |
| SL183072-TB | 101              | 360        | 540 | 134 | 5         | 16              | -      | 414                 |
| SL181876-E  | 18,87            | 380        | 480 | 46  | 2,1       | 4               | -      | 415,5               |
| SL182976    | 52,1             | 380        | 520 | 82  | 4         | 5               | -      | 426                 |
| SL183076-TB | 106              | 380        | 560 | 135 | 5         | 16              | -      | 431,7               |





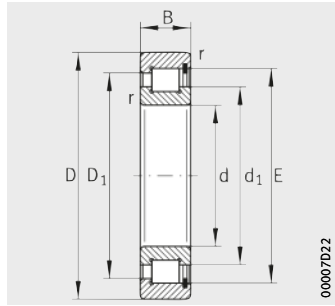
1) Axial displacement "s"

| D <sub>1</sub> | E      | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ur</sub><br>kN | Limiting speed<br>n <sub>G</sub><br>min <sup>-1</sup> | Reference speed<br>n <sub>B</sub><br>min <sup>-1</sup> |
|----------------|--------|------------------------------|--------------------------------|---|---|--|
|                |        | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |   |   |  |
| ≈ 263,5        | –      | 1 680                        | 1 900                          | 265   | 1 380   | 840  |
| 284,4          | –      | 1 900                        | 2 170                          | 300   | 1 280   | 760  |
| 295            | –      | 2 070                        | 2 380                          | 320   | 1 240   | 730  |
| 279,5          | 294    | 1 180                        | 1 760                          | 208   | 1 270   | 800  |
| 312,9          | –      | 2 190                        | 2 600                          | 345   | 1 160   | 670  |
| 295,5          | 311,5  | 1 300                        | 1 900                          | 223   | 1 210   | 770  |
| 326,8          | –      | 2 500                        | 2 950                          | 390   | 1 120   | 630  |
| 302,4          | 319,4  | 1 410                        | 2 010                          | 235   | 1 180   | 770  |
| 347,2          | –      | 2 800                        | 3 300                          | 420   | 1 060   | 570  |
| 299,2          | 312    | 1 150                        | 1 820                          | 209   | 1 170   | 800  |
| 388,3          | –      | 3 000                        | 3 450                          | 425   | 950   | 520  |
| 294,4          | 303,7  | 600                          | 1 120                          | 124   | 1 150   | 750  |
| 322,1          | 336    | 1 210                        | 1 990                          | 224   | 1 080   | 720  |
| 408,5          | –      | 3 300                        | 3 800                          | 465   | 900   | 500  |
| 301,5          | 308    | 275                          | 530                            | 54  | 1 110   | 790  |
| 323,4          | 333,7  | 780                          | 1 450                          | 160   | 1 060   | 690  |
| 358,4          | 375,97 | 1 600                        | 2 500                          | 280   | 980   | 620  |
| 459,6          | –      | 4 000                        | 4 700                          | 560   | 800   | 410  |
| 327            | 335    | 355                          | 670                            | 69  | 1 030   | 730  |
| 348,5          | 359,5  | 910                          | 1 710                          | 184   | 980   | 590  |
| 372,9          | 390,3  | 1 650                        | 2 650                          | 290   | 940   | 590  |
| 350,5          | 360    | 455                          | 840                            | 86  | 960   | 680  |
| 376,9          | 389,45 | 1 170                        | 2 200                          | 235   | 910   | 540  |
| 415,6          | 434,85 | 2 020                        | 3 300                          | 325   | 840   | 500  |
| 371,5          | 381    | 470                          | 900                            | 90  | 910   | 620  |
| 397,4          | 409,85 | 1 210                        | 2 340                          | 246   | 860   | 495  |
| 430,1          | 449,5  | 2 080                        | 3 450                          | 340   | 810   | 480  |
| 392,5          | 402,2  | 485                          | 960                            | 94  | 860   | 570  |
| 418,7          | 430,2  | 1 250                        | 2 470                          | 255   | 810   | 460  |
| 463,9          | 485,65 | 2 490                        | 4 150                          | 400   | 750   | 430  |
| 413,5          | 423,5  | 500                          | 1 010                          | 98  | 810   | 530  |
| 438,6          | 450,6  | 1 280                        | 2 600                          | 265   | 770   | 430  |
| 481,6          | 503,45 | 2 550                        | 4 350                          | 410   | 720   | 405  |
| 448            | 459    | 650                          | 1 290                          | 126   | 750   | 490  |
| 472,1          | 486,7  | 1 660                        | 3 300                          | 335   | 720   | 380  |
| 499,5          | 521,25 | 2 600                        | 4 450                          | 425   | 700   | 390  |

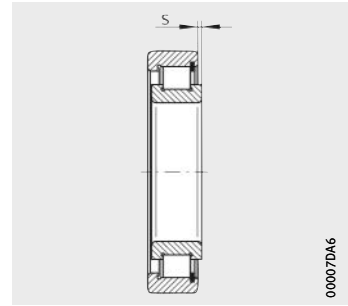


# Single row full complement cylindrical roller bearings

Semi-locating bearings



SL1818, SL1829, SL1830

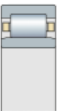


1) Axial displacement "s"

Dimension table (continued) · Dimensions in mm

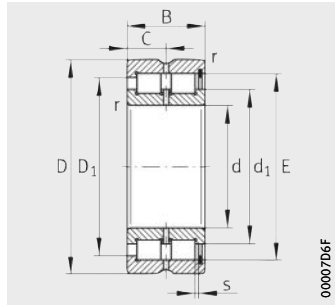
| Designation         | Mass<br>m<br>≈kg | Dimensions |     |     |           |                 |                     |
|---------------------|------------------|------------|-----|-----|-----------|-----------------|---------------------|
|                     |                  | d          | D   | B   | r<br>min. | s <sup>1)</sup> | d <sub>1</sub><br>≈ |
| <b>SL181880-E</b>   | 19,81            | <b>400</b> | 500 | 46  | 2,1       | 4               | 432                 |
| <b>SL182980</b>     | 54,3             | <b>400</b> | 540 | 82  | 4         | 5               | 450                 |
| <b>SL183080-TB</b>  | 140              | <b>400</b> | 600 | 148 | 5         | 18              | 462,5               |
| <b>SL181884-E</b>   | 20,6             | <b>420</b> | 520 | 46  | 2,1       | 4               | 457                 |
| <b>SL182984</b>     | 56,9             | <b>420</b> | 560 | 82  | 4         | 5               | 462                 |
| <b>SL181888-E</b>   | 21,54            | <b>440</b> | 540 | 46  | 2,1       | 4               | 473,5               |
| <b>SL182988</b>     | 78,1             | <b>440</b> | 600 | 95  | 4         | 7               | 490                 |
| <b>SL181892-E</b>   | 33,21            | <b>460</b> | 580 | 56  | 3         | 5               | 501,5               |
| <b>SL182992</b>     | 81,1             | <b>460</b> | 620 | 95  | 4         | 7               | 504                 |
| <b>SL181896-E</b>   | 34,53            | <b>480</b> | 600 | 56  | 3         | 5               | 522                 |
| <b>SL182996</b>     | 94,7             | <b>480</b> | 650 | 100 | 5         | 7               | 538                 |
| <b>SL1818/500-E</b> | 35,73            | <b>500</b> | 620 | 56  | 3         | 5               | 542                 |
| <b>SL1829/500</b>   | 98,3             | <b>500</b> | 670 | 100 | 5         | 7               | 553                 |

| D <sub>1</sub> | E      | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ur</sub><br>kN | Limiting speed<br>n <sub>G</sub><br>min <sup>-1</sup> | Reference speed<br>n <sub>B</sub><br>min <sup>-1</sup> |
|----------------|--------|------------------------------|--------------------------------|---|---|--|
|                |        | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |   |   |  |
| ≈ 464,5        | 475,5  | 660                          | 1 340                          | 130   | 720   | 470  |
| 496,1          | 510,85 | 1 710                        | 3 500                          | 350   | 690   | 350  |
| 535,1          | 558,52 | 3 050                        | 5 400                          | 500   | 650   | 345  |
| 489,5          | 500    | 680                          | 1 420                          | 135   | 690   | 430  |
| 509            | 522,95 | 1 730                        | 3 600                          | 355   | 670   | 340  |
| 506            | 517    | 700                          | 1 470                          | 139   | 660   | 415  |
| 544,6          | 562    | 2 090                        | 4 100                          | 405   | 630   | 325  |
| 541            | 554    | 940                          | 1 890                          | 179   | 620   | 385  |
| 559,6          | 576,3  | 2 130                        | 4 250                          | 410   | 610   | 310  |
| 561            | 474,5  | 960                          | 1 970                          | 185   | 600   | 365  |
| 596,6          | 614,75 | 2 390                        | 4 800                          | 460   | 570   | 280  |
| 581,5          | 594,5  | 980                          | 2 050                          | 190   | 580   | 345  |
| 612,7          | 630    | 2 430                        | 4 950                          | 470   | 560   | 270  |

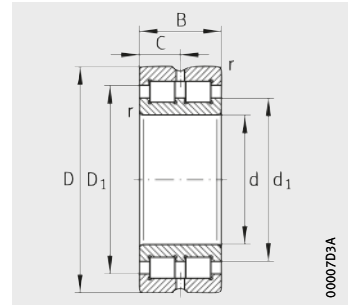


# Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



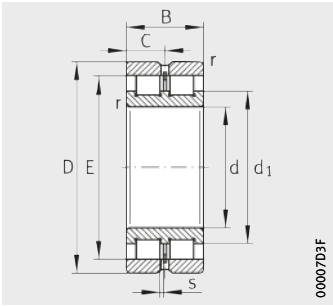
SL1850  
Semi-locating bearings



SL0148, SL0149  
Locating bearings

**Dimension table** - Dimensions in mm

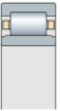
| Semi-locating bearings<br>Designation | Locating bearings<br>Designation | Non-locating bearings<br>Designation | Designation<br>to DIN 5412 | Mass<br>m<br>≈kg | Dimensions |     |     |           |      |
|---------------------------------------|----------------------------------|--------------------------------------|----------------------------|------------------|------------|-----|-----|-----------|------|
|                                       |                                  |                                      |                            |                  | d          | D   | B   | r<br>min. | s    |
| <b>SL185044</b>                       | –                                | –                                    | –                          | 51,6             | <b>220</b> | 340 | 160 | 3         | 9    |
| –                                     | <b>SL014948</b>                  | –                                    | NNC 4948 V                 | 18,5             | <b>240</b> | 320 | 80  | 2,1       | –    |
| –                                     | –                                | <b>SL024948</b>                      | NNCL 4948 V                | 17,9             | <b>240</b> | 320 | 80  | 2,1       | 5    |
| <b>SL185048</b>                       | –                                | –                                    | –                          | 55,2             | <b>240</b> | 360 | 160 | 3         | 9    |
| –                                     | <b>SL014852</b>                  | –                                    | NNC 4852 V                 | 11               | <b>260</b> | 320 | 60  | 2         | –    |
| –                                     | –                                | <b>SL024852</b>                      | NNCL 4852 V                | 10,6             | <b>260</b> | 320 | 60  | 2         | 4    |
| –                                     | <b>SL014952</b>                  | –                                    | NNC 4952 V                 | 32               | <b>260</b> | 360 | 100 | 2,1       | –    |
| –                                     | –                                | <b>SL024952</b>                      | NNCL 4952 V                | 31,2             | <b>260</b> | 360 | 100 | 2,1       | 6    |
| <b>SL185052</b>                       | –                                | –                                    | –                          | 82,6             | <b>260</b> | 400 | 190 | 4         | 11,3 |
| –                                     | <b>SL014856</b>                  | –                                    | NNC 4856 V                 | 16               | <b>280</b> | 350 | 69  | 2         | –    |
| –                                     | –                                | <b>SL024856</b>                      | NNCL 4856 V                | 15,6             | <b>280</b> | 350 | 69  | 2         | 4    |
| –                                     | <b>SL014956</b>                  | –                                    | NNC 4956 V                 | 34               | <b>280</b> | 380 | 100 | 2,1       | –    |
| –                                     | –                                | <b>SL024956</b>                      | NNCL 4956 V                | 33,1             | <b>280</b> | 380 | 100 | 2,1       | 6    |
| <b>SL185056</b>                       | –                                | –                                    | –                          | 88               | <b>280</b> | 420 | 190 | 4         | 11,3 |
| –                                     | <b>SL014860</b>                  | –                                    | NNC 4860 V                 | 23               | <b>300</b> | 380 | 80  | 2,1       | –    |
| –                                     | –                                | <b>SL024860</b>                      | NNCL 4860 V                | 22               | <b>300</b> | 380 | 80  | 2,1       | 6    |
| –                                     | <b>SL014960</b>                  | –                                    | NNC 4960 V                 | 53               | <b>300</b> | 420 | 118 | 3         | –    |
| –                                     | –                                | <b>SL024960</b>                      | NNCL 4960 V                | 51,9             | <b>300</b> | 420 | 118 | 3         | 6    |
| <b>SL185060-TB</b>                    | –                                | –                                    | –                          | 124              | <b>300</b> | 460 | 218 | 4         | 12,5 |
| –                                     | <b>SL014864</b>                  | –                                    | NNC 4864 V                 | 24               | <b>320</b> | 400 | 80  | 2,1       | –    |
| –                                     | –                                | <b>SL024864</b>                      | NNCL 4864 V                | 23,5             | <b>320</b> | 400 | 80  | 2,1       | 6    |
| –                                     | <b>SL014964</b>                  | –                                    | NNC 4964 V                 | 56               | <b>320</b> | 440 | 118 | 3         | –    |
| –                                     | –                                | <b>SL024964</b>                      | NNCL 4964 V                | 54,9             | <b>320</b> | 440 | 118 | 3         | 6    |
| <b>SL185064-TB</b>                    | –                                | –                                    | –                          | 128,4            | <b>320</b> | 480 | 218 | 4         | 12,5 |
| –                                     | <b>SL014868</b>                  | –                                    | NNC 4868 V                 | 25,5             | <b>340</b> | 420 | 80  | 2,1       | –    |
| –                                     | –                                | <b>SL024868</b>                      | NNCL 4868 V                | 25               | <b>340</b> | 420 | 80  | 2,1       | 6    |
| –                                     | <b>SL014968</b>                  | –                                    | NNC 4968 V                 | 59               | <b>340</b> | 460 | 118 | 3         | –    |
| –                                     | –                                | <b>SL024968</b>                      | NNCL 4968 V                | 57,8             | <b>340</b> | 460 | 118 | 3         | 6    |
| <b>SL185068-TB</b>                    | –                                | –                                    | –                          | 178              | <b>340</b> | 520 | 243 | 5         | 14,3 |
| –                                     | <b>SL014872</b>                  | –                                    | NNC 4872 V                 | 27               | <b>360</b> | 440 | 80  | 2,1       | –    |
| –                                     | –                                | <b>SL024872</b>                      | NNCL 4872 V                | 26               | <b>360</b> | 440 | 80  | 2,1       | 6    |
| –                                     | <b>SL014972</b>                  | –                                    | NNC 4972 V                 | 62,1             | <b>360</b> | 480 | 118 | 3         | –    |
| –                                     | –                                | <b>SL024972</b>                      | NNCL 4972 V                | 60,8             | <b>360</b> | 480 | 118 | 3         | 6    |
| <b>SL185072-TB</b>                    | –                                | –                                    | –                          | 178              | <b>360</b> | 540 | 243 | 5         | 14   |



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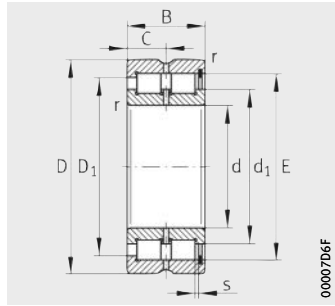
**SL0248, SL0249**  
Non-locating bearings

|       |                    |                    |        | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|-------|--------------------|--------------------|--------|---------------------|-------------------------|--------------------------------------|--|---|
| C     | $d_1$<br>$\approx$ | $D_1$<br>$\approx$ | E      | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
| 80    | 254,6              | 297,8              | 312,2  | 1980                | 3 650                   | 420                                  | 1 170  | 630   |
| 40    | 270,6              | 292,3              | –      | 740                 | 1 700                   | 186                                  | 1 150  | 660   |
| 40    | 270,6              | –                  | 299,46 | 740                 | 1 700                   | 186                                  | 1 150  | 660   |
| 80    | 277,5              | 322,1              | 335,1  | 2 080               | 4 000                   | 445                                  | 1 080  | 550   |
| 30    | 281,8              | 298,8              | –      | 540                 | 1 370                   | 143                                  | 1 120  | 650   |
| 30    | 281,8              | –                  | 304,2  | 540                 | 1 370                   | 143                                  | 1 120  | 650   |
| 50    | 294,5              | 322,1              | –      | 1 100               | 2 470                   | 270                                  | 1 050  | 570   |
| 50    | 294,5              | –                  | 331,33 | 1 100               | 2 470                   | 270                                  | 1 050  | 570   |
| 95    | 304                | 359,7              | 375,97 | 2 750               | 5 000                   | 560                                  | 980  | 490   |
| 34,5  | 306,8              | 326,4              | –      | 700                 | 1 820                   | 189                                  | 1 020  | 570   |
| 34,5  | 306,8              | –                  | 332,4  | 700                 | 1 820                   | 189                                  | 1 020  | 570   |
| 50    | 316,5              | 344,6              | –      | 1 150               | 2 650                   | 285                                  | 980  | 520   |
| 50    | 316,5              | –                  | 353,34 | 1 150               | 2 650                   | 285                                  | 980  | 520   |
| 95    | 318,3              | 374,1              | 390,3  | 2 850               | 5 300                   | 580                                  | 940  | 460   |
| 40    | 327,9              | 349,9              | –      | 820                 | 2 070                   | 214                                  | 960  | 550   |
| 40    | 327,9              | –                  | 356,7  | 820                 | 2 070                   | 214                                  | 960  | 550   |
| 59    | 340,7              | 374,3              | –      | 1 630               | 3 700                   | 390                                  | 910  | 445   |
| 59    | 340,7              | –                  | 385,51 | 1 630               | 3 700                   | 390                                  | 910  | 445   |
| 109   | 353,6              | 413,6              | 433,6  | 3 450               | 6 600                   | 650                                  | 840  | 395   |
| 40    | 350,9              | 372,9              | –      | 850                 | 2 220                   | 225                                  | 900  | 495   |
| 40    | 350,9              | –                  | 379,7  | 850                 | 2 220                   | 225                                  | 900  | 495   |
| 59    | 367,5              | 401,1              | –      | 1 700               | 4 050                   | 415                                  | 840  | 395   |
| 59    | 367,5              | –                  | 412,27 | 1 700               | 4 050                   | 415                                  | 840  | 395   |
| 109   | 369,5              | 431,5              | 449,5  | 3 550               | 6 900                   | 680                                  | 810  | 375   |
| 40    | 368,1              | 390,1              | –      | 870                 | 2 330                   | 233                                  | 860  | 465   |
| 40    | 368,1              | –                  | 396,9  | 870                 | 2 330                   | 233                                  | 860  | 465   |
| 59    | 385,3              | 418,9              | –      | 1 750               | 4 250                   | 430                                  | 810  | 375   |
| 59    | 385,3              | –                  | 430,11 | 1 750               | 4 250                   | 430                                  | 810  | 375   |
| 121,5 | 396                | 465,5              | 485,65 | 4 250               | 8 300                   | 800                                  | 750  | 355   |
| 40    | 391                | 413,2              | –      | 900                 | 2 480                   | 244                                  | 810  | 430   |
| 40    | 391                | –                  | 419,8  | 900                 | 2 480                   | 244                                  | 810  | 430   |
| 59    | 404                | 436,8              | –      | 1 790               | 4 450                   | 445                                  | 770  | 350   |
| 59    | 404                | –                  | 447,95 | 1 790               | 4 450                   | 445                                  | 770  | 350   |
| 121,5 | 413,8              | 481                | 503,45 | 4 400               | 8 700                   | 820                                  | 720  | 320   |

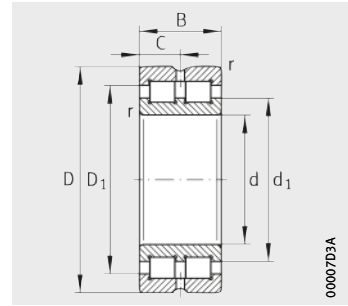


# Double row full complement cylindrical roller bearings

Full complement, double row Semi-locating, locating and non-locating bearings



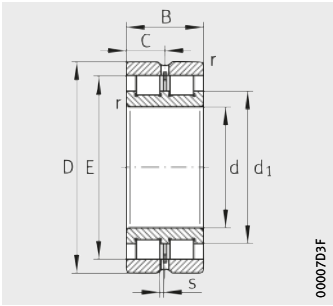
SL1850  
Semi-locating bearings



SL0148, SL0149  
Locating bearings

**Dimension table** (continued) · Dimensions in mm

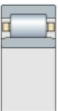
| Semi-locating bearings<br>Designation | Locating bearings<br>Designation | Non-locating bearings<br>Designation | Designation<br>to DIN 5412 | Mass<br>m<br>≈kg | Dimensions |     |     |           |      |
|---------------------------------------|----------------------------------|--------------------------------------|----------------------------|------------------|------------|-----|-----|-----------|------|
|                                       |                                  |                                      |                            |                  | d          | D   | B   | r<br>min. | s    |
| –                                     | <b>SL014876</b>                  | –                                    | NNC 4876 V                 | 45,5             | <b>380</b> | 480 | 100 | 2,1       | –    |
| –                                     | –                                | <b>SL024876</b>                      | NNCL 4876 V                | 44               | <b>380</b> | 480 | 100 | 2,1       | 6    |
| –                                     | <b>SL014976</b>                  | –                                    | NNC 4976 V                 | 92,4             | <b>380</b> | 520 | 140 | 4         | –    |
| –                                     | –                                | <b>SL024976</b>                      | NNCL 4976 V                | 90,5             | <b>380</b> | 520 | 140 | 4         | 7    |
| <b>SL185076-TB</b>                    | –                                | –                                    | –                          | 196,5            | <b>380</b> | 560 | 243 | 5         | 14,1 |
| –                                     | <b>SL014880</b>                  | –                                    | NNC 4880 V                 | 46,5             | <b>400</b> | 500 | 100 | 2,1       | –    |
| –                                     | –                                | <b>SL024880</b>                      | NNCL 4880 V                | 45,8             | <b>400</b> | 500 | 100 | 2,1       | 6    |
| –                                     | <b>SL014980</b>                  | –                                    | NNC 4980 V                 | 96,5             | <b>400</b> | 540 | 140 | 4         | –    |
| –                                     | –                                | <b>SL024980</b>                      | NNCL 4980 V                | 94,6             | <b>400</b> | 540 | 140 | 4         | 7    |



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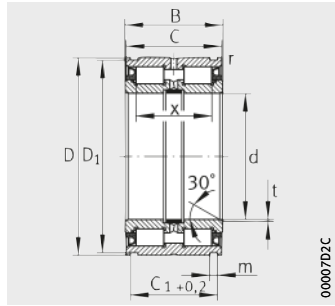
SL0248, SL0249  
Non-locating bearings

|       |                    |                    |        | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|-------|--------------------|--------------------|--------|---------------------|-------------------------|--------------------------------------|--|---|
| C     | $d_1$<br>$\approx$ | $D_1$<br>$\approx$ | E      | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |   |
| 50    | 419                | 447,2              | –      | 1 320               | 3 500                   | 345                                  | 750  | 375   |
| 50    | 419                | –                  | 455,8  | 1 320               | 3 500                   | 345                                  | 750  | 375   |
| 70    | 430,2              | 468,7              | –      | 2 250               | 5 500                   | 560                                  | 720  | 325   |
| 70    | 430,2              | –                  | 481,35 | 2 250               | 5 500                   | 560                                  | 720  | 325   |
| 121,5 | 432                | 499                | 521,25 | 4 450               | 8 900                   | 850                                  | 700  | 305   |
| 50    | 433,8              | 462                | –      | 1 350               | 3 650                   | 355                                  | 720  | 360   |
| 50    | 433,8              | –                  | 470,59 | 1 350               | 3 650                   | 355                                  | 720  | 360   |
| 70    | 450,5              | 489                | –      | 2 310               | 5 800                   | 580                                  | 690  | 300   |
| 70    | 450,5              | –                  | 501,74 | 2 310               | 5 800                   | 580                                  | 690  | 300   |

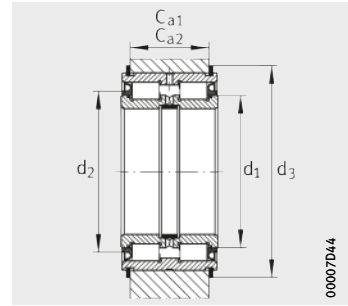


# Cable sheave bearings

Cylindrical roller bearings with annular slots  
Full complement, sealed  
Locating bearings



SL0450..-PP  
SL04..-PP



Mounting dimensions

**Dimension table** - Dimensions in mm

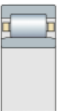
| Designation        | Mass<br>m<br>≈kg | Dimensions |     |     |     |                        |                |     |           |   |     |
|--------------------|------------------|------------|-----|-----|-----|------------------------|----------------|-----|-----------|---|-----|
|                    |                  | d          | D   | B   | C   | C <sub>1</sub><br>+0,2 | D <sub>1</sub> | m   | r<br>min. | t | x   |
| <b>SL045044-PP</b> | 52,5             | <b>220</b> | 340 | 160 | 159 | 138,2                  | 334            | 6,3 | 1         | 2 | 132 |
| <b>SL045048-PP</b> | 56               | <b>240</b> | 360 | 160 | 159 | 138,2                  | 354            | 6,3 | 1         | 2 | 132 |
| <b>SL04240-PP</b>  | 21               | <b>240</b> | 320 | 95  | 94  | 83,2                   | 314            | 6,3 | 1         | 2 | 72  |
| <b>SL045052-PP</b> | 84,5             | <b>260</b> | 400 | 190 | 189 | 162,2                  | 394            | 6,3 | 1,1       | 3 | 150 |
| <b>SL04260-PP</b>  | 22,5             | <b>260</b> | 340 | 95  | 94  | 83,2                   | 334            | 6,3 | 1         | 3 | 75  |
| <b>SL045056-PP</b> | 90               | <b>280</b> | 420 | 190 | 189 | 163,2                  | 413            | 7,3 | 1,1       | 3 | 150 |
| <b>SL045060-PP</b> | 126              | <b>300</b> | 460 | 218 | 216 | 185,2                  | 453            | 7,3 | 1,1       | 3 | 170 |
| <b>SL04300-PP</b>  | 25,5             | <b>300</b> | 380 | 95  | 94  | 83,2                   | 374            | 6,3 | 1         | 3 | 75  |

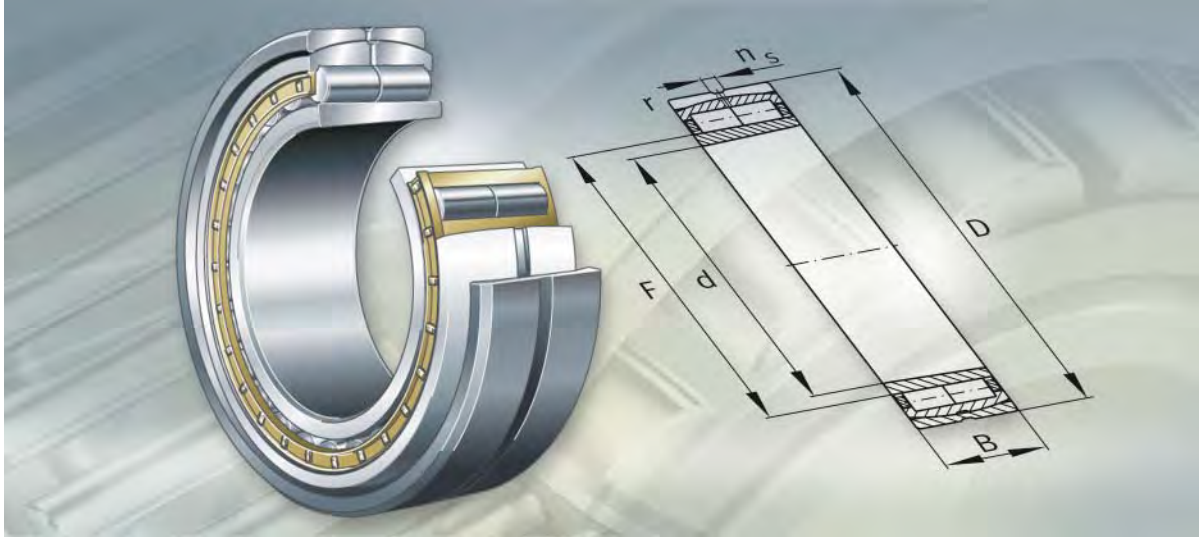
1) For snap rings WRE.

2) For retaining ring to DIN 471.



| Mounting dimensions |               |        |       |            | Basic load ratings |                | Fatigue limit load | Limiting speed    | Snap ring WRE | Retaining ring to DIN 471 |
|---------------------|---------------|--------|-------|------------|--------------------|----------------|--------------------|-------------------|---------------|---------------------------|
| $C_{a1}^{1)}$       | $C_{a2}^{2)}$ | $d_1$  | $d_2$ | $d_3^{1)}$ | dyn. $C_r$         | stat. $C_{or}$ | $C_{ur}$           | $n_G$ grease      |               |                           |
| -0,2                | -0,2          |        |       |            | kN                 | kN             | kN                 | $\text{min}^{-1}$ |               |                           |
| 130                 | 126           | 259,85 | 286   | 366        | 1 570              | 3 050          | 350                | 480               | WRE340        | 340X6                     |
| 130                 | 126           | 279,25 | 305   | 386        | 1 630              | 3 300          | 370                | 440               | WRE360        | 360X6                     |
| 75                  | 71            | 271,7  | 287   | 346        | 740                | 1 700          | 186                | 480               | WRE320        | 320X6                     |
| 154                 | 150           | 304,95 | 336   | 426        | 2 380              | 4 700          | 520                | 400               | WRE400        | 400X6                     |
| 75                  | 71            | 292,7  | 310   | 366        | 840                | 1 990          | 215                | 440               | WRE340        | 340X6                     |
| 154                 | 149           | 320,95 | 354   | 453        | 2 600              | 5 200          | 570                | 380               | WRE420        | 420X7                     |
| 176                 | 171           | 346,85 | 375   | 493        | 3 000              | 5 800          | 620                | 340               | WRE460        | 460X7                     |
| 75                  | 71            | 328    | 346   | 406        | 900                | 2 250          | 234                | 380               | WRE380        | 380X6                     |

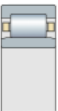




## Self-aligning cylindrical roller bearings

# Self-aligning cylindrical roller bearings

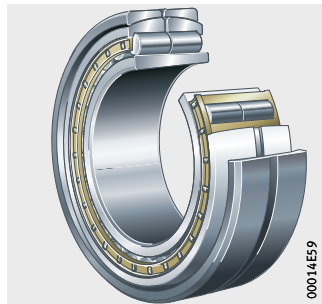
|                                     | Page   |
|-------------------------------------|--|
| <b>Product overview</b>             | Self-aligning cylindrical roller bearings ..... 466                                    |
| <b>Features</b>                     | Bearings with tapered bore ..... 467   |
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|                                     | Lubrication ..... 467  |
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|                                     | Suffixes..... 468  |
| <b>Design and safety guidelines</b> | Permissible skewing..... 469   |
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|                                     | Equivalent static bearing load..... 469  |
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## Product overview Self-aligning cylindrical roller bearings

### Non-locating bearings With tapered bore

Z-5..ZL2-02, F-8..ZL2-02



# Self-aligning cylindrical roller bearings

**Features** These double row cylindrical roller bearings comprise solid bearing rings and cylindrical roller and cage assemblies with solid cages. The bearings have outer rings with two rigid ribs and ribless inner rings. The spherical outer ring is seated in a plain bearing pivot ring and can compensate misalignment of the bearing seats as well as deflections. The ribless inner ring allows constraint-free axial displacement in the bearing. The very high radial load carrying capacity of the cylindrical roller bearing is maintained in full even under large displacements.

The external dimensions of the complete bearing with the pivot ring correspond to the main dimensions of dimension series 30, 22 and 31 to DIN 616.

These bearings are used as non-locating bearings on the tending side of the dryer roll in paper machinery. They are mounted in normal paper machinery housings.

The same design is used in cylindrical roller bearings with main dimensions of dimension series 22, 23 and 32 that are intended for guide rolls.

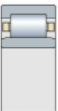
**Bearings with tapered bore** Self-aligning double row cylindrical roller bearings with a tapered bore (taper 1:12) are directly located on tapered journals. The radial internal clearance can thus be set to an optimum value.

**Non-locating bearings** All self-aligning double row cylindrical roller bearings are non-locating bearings and can support radial forces only. The changes in length of the heated dryer roll are made possible without constraint in the cylindrical roller bearing between the raceway of the inner ring and the rolling elements. Axial forces are supported on the drive side of the dryer roll by spherical roller bearings.

**Axial displacement** The outer and inner ring can be axially displaced relative to each other from the central position by the values “s” stated in the dimension tables.

**Sealing** The bearings are supplied without seals.

**Lubrication** The plain bearing pivot ring and the bearing outer ring each have a lubrication groove and lubrication holes for the best possible supply of lubricant directly into the interior of the bearing. Due to the central position of the feed, oil outlet of a high quality oil corresponding to ISO-VG 220 or 320 is possible on both sides of the bearing.



# Self-aligning cylindrical roller bearings

## Operating temperature and material

The ambient temperature for bearings in the dry section of paper machinery may be more than +100 °C on a continuous basis. By means of bainitic hardening, the rings of the double row cylindrical roller bearings are dimensionally stabilised up to +200 °C. Connection to a central recirculating oil lubrication system allows heat to be continuously dissipated from the bearing. For dryer rolls and M.G. cylinders with steam heating, case hardened inner rings are recommended and these are indicated by the suffix W209B.

## Cages

Self-aligning double row cylindrical roller bearings have a solid brass cage that encloses both rows of rollers.

## Suffixes

Suffixes for available designs: see table.

## Available designs

| Suffix | Description                                  | Design   |
|--------|--|----------|
| C3     | Radial internal clearance larger than normal | Standard |
| C5     | Radial internal clearance larger than C4     |          |
| K      | Tapered bore (taper 1:12)                    |          |

## Design and safety guidelines

### Permissible skewing

The permissible misalignment between the plain bearing pivot ring and the bearing is 2°.

The pivot ring has a Durotect®-Z (zinc phosphate) coating and the concave surface has a molybdenum disulphide coating.

The alignment movement in operation is additionally supported by the steady feed of lubricant.

### Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_r$$

P kN

Equivalent dynamic bearing load

F<sub>r</sub> kN

Radial dynamic bearing load.

### Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

P<sub>0</sub> kN

Equivalent static bearing load

F<sub>0r</sub> kN

Radial static bearing load.

### Minimum radial load

In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{0r}/60$  is necessary.

If  $F_{r \min} < C_{0r}/60$ , please contact us.



## Design of bearing arrangements

### Mounting dimensions

The dimension tables give the maximum dimension of the radius  $r_a$  and the diameters of the abutment shoulders  $D_a, d_a$ .



# Self-aligning cylindrical roller bearings

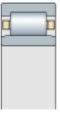
**Accuracy** The dimensional and running tolerances of the bearings correspond to tolerance class PN to DIN 620.

**Radial internal clearance** Due to the high operating temperatures and the associated large temperature differential between the inner and outer ring, the bearings for dryer rolls and M.G. cylinders are supplied with the increased radial internal clearance C5. Bearings for guide rolls have the increased radial internal clearance C3.

**Radial internal clearance of cylindrical roller bearings with tapered bore**

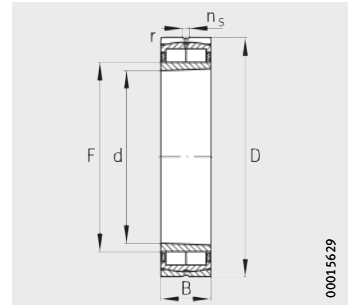
| Bore<br>d<br>mm |       | Radial internal clearance |      |          |      |          |      |          |      |
|-----------------|-------|---------------------------|------|----------|------|----------|------|----------|------|
|                 |       | CN<br>μm                  |      | C3<br>μm |      | C4<br>μm |      | C5<br>μm |      |
| over            | incl. | min.                      | max. | min.     | max. | min.     | max. | min.     | max. |
| 180             | 200   | 140                       | 195  | 180      | 235  | 220      | 275  | 275      | 330  |
| 200             | 225   | 155                       | 215  | 200      | 260  | 245      | 305  | 305      | 365  |
| 225             | 250   | 170                       | 235  | 220      | 285  | 270      | 335  | 335      | 400  |
| 250             | 280   | 185                       | 255  | 240      | 310  | 295      | 365  | 365      | 435  |
| 280             | 315   | 205                       | 280  | 265      | 340  | 325      | 400  | 400      | 475  |
| 315             | 355   | 225                       | 305  | 290      | 370  | 355      | 435  | 435      | 515  |
| 355             | 400   | 255                       | 345  | 330      | 420  | 405      | 495  | 495      | 585  |
| 400             | 450   | 285                       | 385  | 370      | 470  | 455      | 555  | 555      | 655  |
| 450             | 500   | 315                       | 425  | 410      | 520  | 505      | 615  | 615      | 725  |
| 500             | 560   | 350                       | 470  | 455      | 575  | 560      | 680  | 680      | 800  |
| 560             | 630   | 380                       | 500  | 500      | 620  | 620      | 740  | 740      | 860  |
| 630             | 710   | 435                       | 575  | 565      | 705  | 695      | 835  | 835      | 975  |





# Self-aligning cylindrical roller bearings

Double row,  
with tapered bore (taper 1:12)

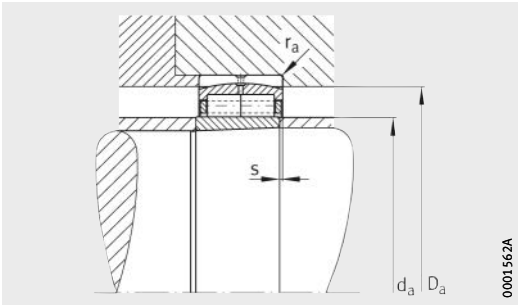


**Dimension table** - Dimensions in mm

| Designation             | Mass<br>m<br>≈kg | Dimensions |     |     |   |                 |     |                |
|-------------------------|------------------|------------|-----|-----|---|-----------------|-----|----------------|
|                         |                  | d          | D   | B   | r | s <sup>1)</sup> | F   | n <sub>s</sub> |
| <b>F-804272.ZL-K-C3</b> | 44,3             | <b>150</b> | 320 | 108 | 3 | 13              | 184 | 17,7           |
| <b>Z-548428.ZL-K-C3</b> | 53,9             | <b>160</b> | 340 | 114 | 4 | 13              | 196 | 17,7           |
| <b>Z-567601.ZL-K-C3</b> | 31,7             | <b>180</b> | 320 | 86  | 4 | 7,5             | 211 | 17,7           |
| <b>Z-567601.ZL-K-C5</b> | 31,7             | <b>180</b> | 320 | 86  | 4 | 7,5             | 211 | 17,7           |
| <b>F-803792.ZL-K-C3</b> | 40,5             | <b>180</b> | 320 | 112 | 4 | 12,5            | 211 | 15             |
| <b>Z-580454.ZL-K-C5</b> | 36               | <b>190</b> | 320 | 104 | 3 | 10,5            | 222 | 15             |
| <b>Z-566170.ZL-K-C3</b> | 38,5             | <b>190</b> | 340 | 92  | 4 | 8,5             | 223 | 17,7           |
| <b>Z-566170.ZL-K-C5</b> | 38,5             | <b>190</b> | 340 | 92  | 4 | 8,5             | 223 | 17,7           |
| <b>Z-566487.ZL-K-C5</b> | 44,6             | <b>200</b> | 340 | 112 | 3 | 9,5             | 233 | 17,7           |
| <b>F-804462.ZL-K-C3</b> | 60               | <b>200</b> | 360 | 128 | 4 | 12,5            | 234 | 17,7           |
| <b>Z-565531.ZL-K-C5</b> | 31,5             | <b>220</b> | 340 | 90  | 3 | 7,5             | 246 | 15             |
| <b>Z-565688.ZL-K-C5</b> | 55,5             | <b>220</b> | 370 | 120 | 4 | 8,5             | 256 | 17,7           |
| <b>Z-567498.ZL-K-C3</b> | 63,5             | <b>220</b> | 400 | 108 | 4 | 10,5            | 258 | 17,7           |
| <b>Z-567498.ZL-K-C5</b> | 63,5             | <b>220</b> | 400 | 108 | 4 | 10,5            | 258 | 17,7           |
| <b>F-804463.ZL-K-C3</b> | 86,7             | <b>220</b> | 400 | 144 | 4 | 10,5            | 260 | 17,7           |
| <b>Z-565668.ZL-K-C5</b> | 34,6             | <b>240</b> | 360 | 92  | 3 | 8               | 269 | 15             |
| <b>Z-566484.ZL-K-C5</b> | 68               | <b>240</b> | 400 | 128 | 4 | 12              | 278 | 17,7           |
| <b>F-804464.ZL-K-C3</b> | 115              | <b>240</b> | 440 | 160 | 4 | 13              | 285 | 23,5           |
| <b>Z-565499.ZL-K-C5</b> | 49,7             | <b>260</b> | 400 | 104 | 4 | 10              | 292 | 17,7           |
| <b>Z-566488.ZL-K-C5</b> | 93,6             | <b>260</b> | 440 | 144 | 4 | 16              | 301 | 17,7           |
| <b>Z-565669.ZL-K-C5</b> | 58,8             | <b>280</b> | 420 | 106 | 4 | 11              | 313 | 17,7           |
| <b>Z-566489.ZL-K-C5</b> | 102              | <b>280</b> | 460 | 146 | 5 | 16              | 324 | 17,7           |
| <b>Z-565670.ZL-K-C5</b> | 75,2             | <b>300</b> | 460 | 118 | 4 | 9,5             | 330 | 17,7           |
| <b>Z-566490.ZL-K-C5</b> | 133              | <b>300</b> | 500 | 160 | 5 | 17,5            | 348 | 17,7           |
| <b>Z-565671.ZL-K-C5</b> | 81,5             | <b>320</b> | 480 | 121 | 4 | 11              | 357 | 17,7           |
| <b>Z-566491.ZL-K-C5</b> | 174              | <b>320</b> | 540 | 176 | 5 | 20,5            | 369 | 23,5           |
| <b>Z-565672.ZL-K-C5</b> | 109              | <b>340</b> | 520 | 133 | 5 | 14              | 381 | 23,5           |
| <b>Z-566492.ZL-K-C5</b> | 221              | <b>340</b> | 580 | 190 | 5 | 17,5            | 390 | 23,5           |

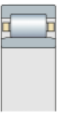
Bearings with case hardened inner rings have the suffix W209B.

Ordering example: Z-566490.ZL-K-W209B-C5.



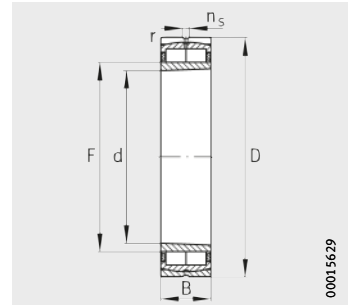
1) Axial displacement "s"

| Mounting dimensions |       |       | Basic load ratings |                   | Fatigue limit load | Limiting speed    |
|---------------------|-------|-------|--------------------|-------------------|--------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ | $C_{ur}$           | $n_G$             |
| max.                | max.  | max.  | kN                 | kN                | kN                 | $\text{min}^{-1}$ |
| 182,5               | 303   | 2,5   | 1 110              | 1 600             | 177                | 2 800             |
| 194,4               | 323   | 3     | 1 240              | 1 870             | 206                | 2 600             |
| 209,2               | 303   | 3     | 910                | 1 530             | 167                | 2 600             |
| 209,2               | 303   | 3     | 910                | 1 530             | 167                | 2 600             |
| 209,2               | 303   | 3     | 1 040              | 1 830             | 204                | 2 600             |
| 213,1               | 306   | 2,5   | 950                | 1 860             | 212                | 2 400             |
| 221,1               | 323   | 3     | 1 020              | 1 740             | 187                | 2 400             |
| 221,1               | 323   | 3     | 1 020              | 1 740             | 187                | 2 400             |
| 231                 | 326   | 2,5   | 1 150              | 2 250             | 247                | 2 200             |
| 232                 | 343   | 3     | 1 380              | 2 600             | 285                | 2 200             |
| 243,8               | 327,6 | 2,5   | 920                | 1 900             | 206                | 2 200             |
| 253,8               | 353   | 3     | 1 320              | 2 750             | 295                | 2 000             |
| 255,8               | 383   | 3     | 1 440              | 2 350             | 242                | 1 900             |
| 255,8               | 383   | 3     | 1 440              | 2 350             | 242                | 1 900             |
| 257,8               | 383   | 3     | 1 860              | 3 500             | 370                | 1 900             |
| 266,6               | 347,6 | 2,5   | 950                | 2 100             | 222                | 1 900             |
| 275,6               | 383   | 3     | 1 490              | 3 000             | 315                | 1 800             |
| 282,6               | 423   | 3     | 2 160              | 4 200             | 440                | 1 800             |
| 289,4               | 385,4 | 3     | 1 200              | 2 550             | 260                | 1 800             |
| 298,4               | 423   | 3     | 1 790              | 3 600             | 370                | 1 700             |
| 310,2               | 405,4 | 3     | 1 170              | 2 650             | 270                | 1 700             |
| 321,2               | 440   | 4     | 1 830              | 3 950             | 405                | 1 600             |
| 327                 | 445,4 | 3     | 1 580              | 3 450             | 345                | 1 600             |
| 345                 | 480   | 4     | 2 170              | 4 650             | 460                | 1 600             |
| 353,8               | 465,4 | 3     | 1 640              | 3 700             | 360                | 1 500             |
| 365,8               | 520   | 4     | 2 650              | 5 400             | 520                | 1 500             |
| 377,6               | 502   | 4     | 1 940              | 4 150             | 395                | 1 500             |
| 386,6               | 560   | 4     | 3 250              | 6 700             | 640                | 1 400             |



# Self-aligning cylindrical roller bearings

Double row,  
with tapered bore (taper 1:12)

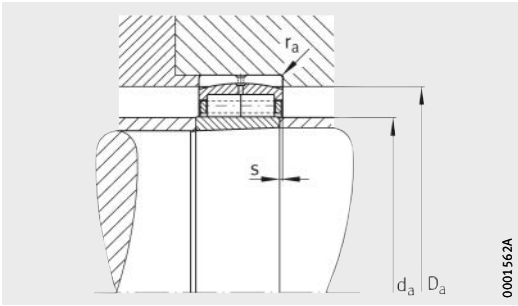


**Dimension table** (continued) · Dimensions in mm

| Designation      | Mass<br>m<br>≈kg | Dimensions |       |     |      |                 |     |                |
|------------------|------------------|------------|-------|-----|------|-----------------|-----|----------------|
|                  |                  | d          | D     | B   | r    | s <sup>1)</sup> | F   | n <sub>s</sub> |
|                  |                  |            |       |     | min. |                 |     |                |
| Z-565673.ZL-K-C5 | 114              | <b>360</b> | 540   | 134 | 5    | 10,5            | 403 | 23,5           |
| F-800479.ZL-K-C5 | 219              | <b>360</b> | 600   | 192 | 5    | 19              | 425 | 23,5           |
| Z-565674.ZL-K-C5 | 121              | <b>380</b> | 560   | 135 | 5    | 10              | 419 | 23,5           |
| F-800480.ZL-K-C5 | 241              | <b>380</b> | 620   | 194 | 5    | 20,5            | 440 | 23,5           |
| Z-565675.ZL-K-C5 | 159              | <b>400</b> | 600   | 148 | 5    | 11,5            | 449 | 23,5           |
| Z-565874.ZL-K-C5 | 140              | <b>400</b> | 650   | 200 | 6    | 17,5            | 450 | 23,5           |
| Z-565676.ZL-K-C5 | 164              | <b>420</b> | 620   | 150 | 5    | 12              | 469 | 23,5           |
| Z-572777.ZL-K-C5 | 363              | <b>420</b> | 700   | 224 | 6    | 19              | 475 | 23,5           |
| Z-565677.ZL-K-C5 | 188              | <b>440</b> | 650   | 157 | 6    | 15,5            | 488 | 23,5           |
| F-800481.ZL-K-C5 | 378              | <b>440</b> | 720   | 226 | 6    | 25              | 492 | 23,5           |
| Z-565678.ZL-K-C5 | 214              | <b>460</b> | 680   | 163 | 6    | 13,5            | 514 | 23,5           |
| F-800482.ZL-K-C5 | 472              | <b>460</b> | 760   | 240 | 7,5  | 22              | 528 | 23,5           |
| Z-565679.ZL-K-C5 | 225              | <b>480</b> | 700   | 165 | 6    | 13,5            | 532 | 23,5           |
| F-800483.ZL-K-C5 | 507              | <b>480</b> | 790   | 248 | 7,5  | 27              | 544 | 23,5           |
| Z-565680.ZL-K-C5 | 234              | <b>500</b> | 720   | 167 | 6    | 14,5            | 553 | 23,5           |
| F-800484.ZL-K-C5 | 621              | <b>500</b> | 830   | 264 | 7,5  | 28              | 568 | 23,5           |
| Z-565681.ZL-K-C5 | 322              | <b>530</b> | 780   | 185 | 6    | 14,5            | 592 | 23,5           |
| Z-574099.ZL-K-C5 | 671              | <b>530</b> | 870   | 272 | 7,5  | 22              | 609 | 23,5           |
| Z-565682.ZL-K-C5 | 365              | <b>560</b> | 820   | 195 | 6    | 15,5            | 618 | 23,5           |
| F-800485.ZL-K-C5 | 771              | <b>560</b> | 920   | 280 | 7,5  | 28              | 630 | 23,5           |
| Z-572367.ZL-K-C5 | 422              | <b>600</b> | 870   | 200 | 6    | 16              | 665 | 23,5           |
| Z-573929.ZL-K-C5 | 962              | <b>600</b> | 980   | 300 | 7,5  | 26              | 678 | 23,5           |
| Z-565684.ZL-K-C5 | 499              | <b>630</b> | 920   | 212 | 7,5  | 17              | 700 | 23,5           |
| F-800592.ZL-K-C5 | 1 110            | <b>630</b> | 1 030 | 315 | 7,5  | 33,5            | 716 | 23,5           |
| Z-565685.ZL-K-C5 | 627              | <b>670</b> | 980   | 230 | 7,5  | 21              | 738 | 23,5           |
| F-800593.ZL-K-C5 | 1 280            | <b>670</b> | 1 090 | 336 | 7,5  | 34              | 755 | 23,5           |
| Z-565686.ZL-K-C5 | 695              | <b>710</b> | 1 030 | 236 | 7,5  | 21              | 778 | 23,5           |
| F-800594.ZL-K-C5 | 1 430            | <b>710</b> | 1 150 | 345 | 7,5  | 38,5            | 795 | 23,5           |

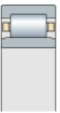
Bearings with case hardened inner rings have the suffix W209B.

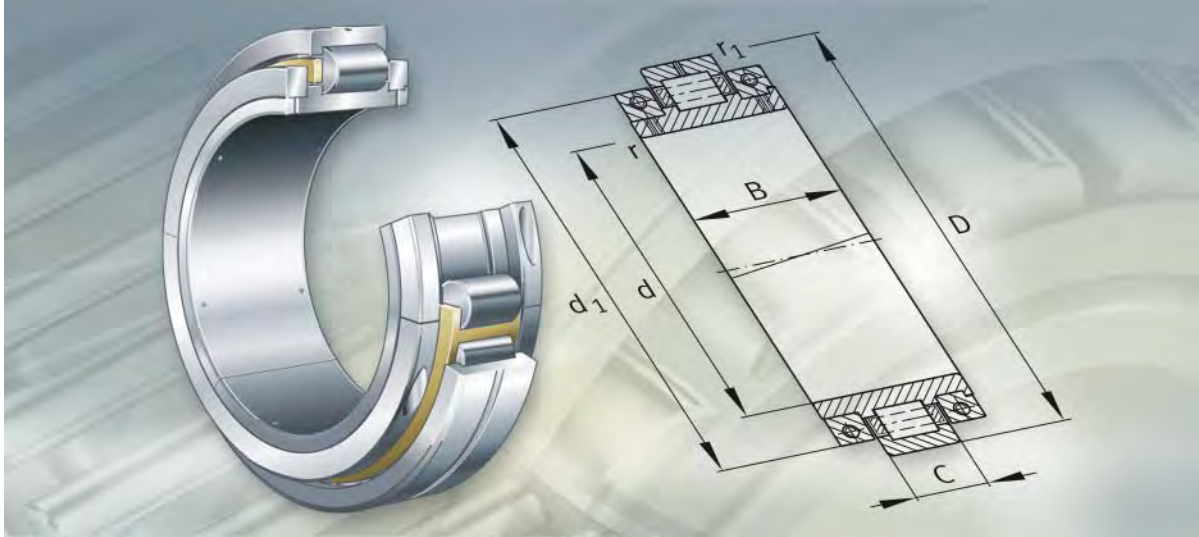
Ordering example: F-800484.ZL-K-W209B-C5.



1) Axial displacement "s"

| Mounting dimensions |       |       | Basic load ratings |                   | Fatigue limit load | Limiting speed    |
|---------------------|-------|-------|--------------------|-------------------|--------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ | $C_{ur}$           | $n_G$             |
| max.                | max.  | max.  | kN                 | kN                | kN                 | $\text{min}^{-1}$ |
| 399,4               | 522   | 4     | 2 070              | 4 750             | 450                | 1 400             |
| 421,4               | 580   | 4     | 3 200              | 6 700             | 630                | 1 300             |
| 415,2               | 542   | 4     | 2 080              | 5 000             | 480                | 1 300             |
| 436,2               | 600   | 4     | 3 300              | 7 300             | 670                | 1 200             |
| 445                 | 582   | 4     | 2 600              | 6 100             | 560                | 1 200             |
| 446                 | 624   | 5     | 3 550              | 7 800             | 730                | 1 200             |
| 464,8               | 602   | 4     | 2 550              | 6 300             | 580                | 1 200             |
| 470,8               | 674   | 5     | 4 500              | 9 600             | 870                | 1 000             |
| 483,6               | 627   | 5     | 2 750              | 6 600             | 590                | 1 100             |
| 487,6               | 694   | 5     | 4 450              | 9 400             | 850                | 1 000             |
| 509,4               | 657   | 5     | 3 050              | 7 600             | 680                | 1 000             |
| 523,4               | 728   | 6     | 5 300              | 11 500            | 1 000              | 950               |
| 527,2               | 677   | 5     | 3 100              | 7 800             | 700                | 950               |
| 539,2               | 758   | 6     | 5 300              | 11 200            | 970                | 900               |
| 548                 | 697   | 5     | 3 150              | 8 100             | 710                | 950               |
| 563                 | 798   | 6     | 6 000              | 12 800            | 1 090              | 850               |
| 586,7               | 757   | 5     | 3 900              | 9 900             | 850                | 850               |
| 603,7               | 838   | 6     | 6 800              | 15 500            | 1 300              | 800               |
| 612,4               | 797   | 5     | 4 350              | 10 900            | 930                | 850               |
| 624,4               | 888   | 6     | 7 100              | 15 400            | 1 260              | 750               |
| 659                 | 847   | 5     | 4 400              | 12 100            | 1 010              | 750               |
| 672                 | 948   | 6     | 8 200              | 18 800            | 1 520              | 700               |
| 693,7               | 892   | 6     | 5 200              | 13 600            | 1 130              | 700               |
| 709,7               | 998   | 6     | 9 000              | 20 000            | 1 600              | 670               |
| 731,3               | 952   | 6     | 5 700              | 15 000            | 1 220              | 670               |
| 748,3               | 1 058 | 6     | 10 200             | 23 000            | 1 810              | 630               |
| 770,9               | 1 002 | 6     | 6 500              | 16 500            | 1 290              | 630               |
| 787,9               | 1 110 | 6     | 10 800             | 24 200            | 1 850              | 600               |

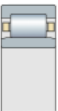




**Split cylindrical roller bearings**

# Split cylindrical roller bearings

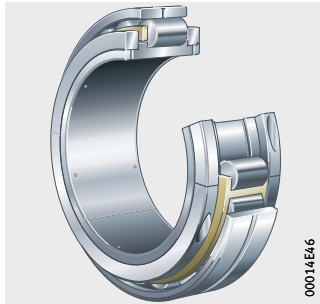
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# Product overview Split cylindrical roller bearings

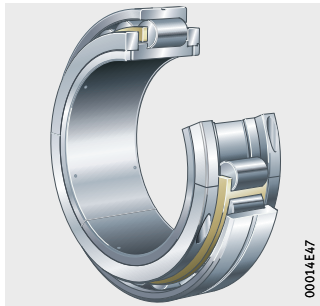
**Non-locating bearings**  
Single row

Z-5..ZL1-05, F-8..ZL1-05



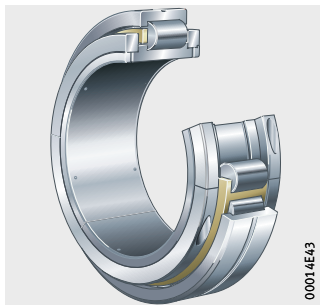
**Semi-locating bearings**  
Single row

Z-5..ZL1-06



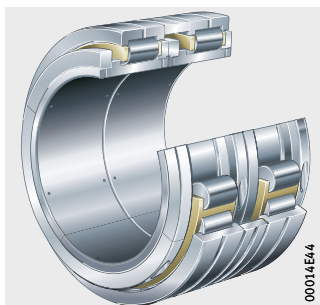
**Locating bearings**  
Single row

Z-5..ZL1-07, F-8..ZL1-07



Double row

Z-5..ZL2-03, F-8..ZL2-03





# Split cylindrical roller bearings

**Features** Split cylindrical roller bearings are generally single row bearings with a cylindrical bore. These bearings comprise two inner ring and two outer ring halves and a split cage with cylindrical rollers.

The outer rings have no rigid ribs, *Figure 1*, one rigid rib, *Figure 2*, page 480, or two rigid ribs, *Figure 3*, page 481.

Only the locating bearings of Design 8 have two rows of rollers, *Figure 4*, page 481.

The inner rings are located on the shaft by means of loose, split locking collars. The rings are split obliquely to the bearing axis in order to ensure that the rolling elements pass over the joints without shocks. The bearing dimensions and designations are not standardised.

**Sealing** The split cylindrical roller bearings are supplied without seals.

**Lubrication** Most bearings can be lubricated via the outer ring or the outer intermediate ring. We recommend grease lubrication due to the simple sealing arrangement and ease of relubrication.

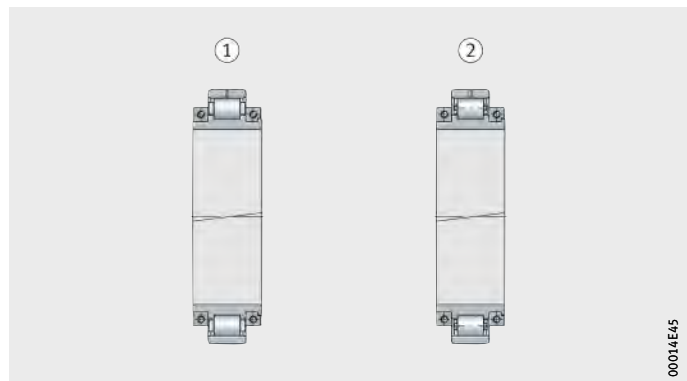
**Non-locating bearings** Non-locating bearings support radial forces only.

Design 1 ■ Ribless outer ring, inner ring with two rigid ribs, solid cage, relubrication facility via the outer ring  
■ Application:  
– for example in air prewarmers, converter drives, drive spindles in rolling mills, bucket wheel excavators.

Design 2 ■ Ribless outer ring, inner ring with two rigid ribs, pin cage, relubrication facility via the outer ring  
■ Application:  
– for example in converter drives, bucket wheel excavators.

- ① Design 1
- ② Design 2

*Figure 1*  
Split cylindrical roller bearings,  
single row non-locating bearings



# Split cylindrical roller bearings

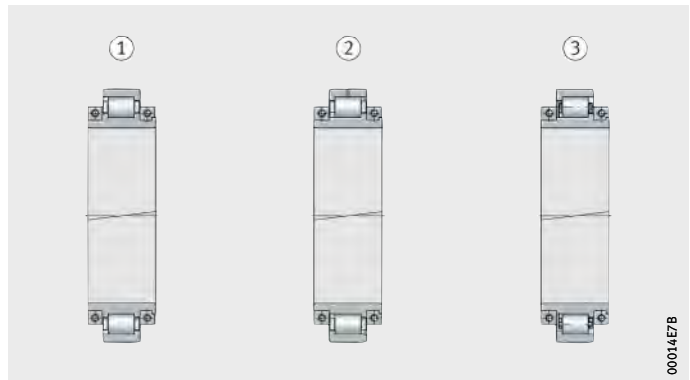
## Semi-locating bearings

In addition to high radial forces, these bearings can also support axial forces in one direction. They act as non-locating bearings in the opposite direction.

- Design 3
- Outer ring with one rigid rib, inner ring with two rigid ribs, solid cage
  - Application:
    - for example in air prewarmers, converter drives, drive spindles in rolling mills, bucket wheel excavators.
- Design 4
- Outer ring with one rigid rib, inner ring with one rigid rib, solid cage, relubrication facility via the outer ring
  - Application:
    - for example in air prewarmers, converter drives, drive spindles in rolling mills, bucket wheel excavators.
- Design 5
- Outer ring with one rigid rib, inner ring with one rigid rib, pin cage
  - Application:
    - for example in converter drives, bucket wheel excavators.

- ① Design 3
- ② Design 4
- ③ Design 5

*Figure 2*  
Split cylindrical roller bearings,  
single row semi-locating bearings



## Locating bearings

In addition to high radial forces, locating bearings can also support axial forces in both directions.

### Single row locating bearings

Design 6

- Outer ring with two rigid ribs, inner ring with two rigid ribs, solid cage

- Application:

- for example in air prewarmers, converter drives, drive spindles in rolling mills, bucket wheel excavators.

Design 7

- Outer ring with two rigid ribs, inner ring with two rigid ribs, pin cage, relubrication facility via the outer ring

- Application:

- for example in converter drives, bucket wheel excavators.

### Double row locating bearings

Design 8

- Double row bearing (two matched single row bearings), specially for drive spindles in rolling mills

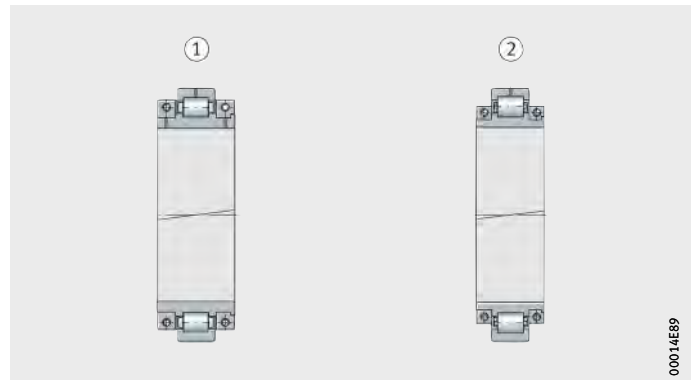
- Relubrication facility via the outer intermediate ring.

① Design 6

② Design 7

*Figure 3*

Split cylindrical roller bearings, single row locating bearings

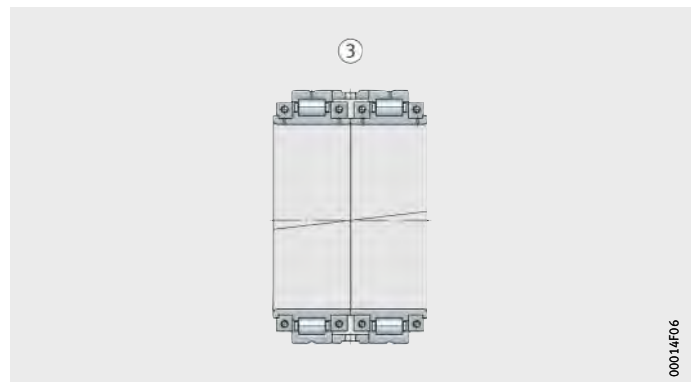


00014E89

① Design 8

*Figure 4*

Split cylindrical roller bearings, double row locating bearings



00014FD6

# Split cylindrical roller bearings

- Operating temperature** Split cylindrical roller bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .
- Cages** The bearings of most designs are fitted with a split solid cage made from brass or steel.  
Bearings of Designs 2, 5 and 7 have a split pin cage made from steel. This offers very high load carrying capacity and is also suitable for strong accelerations and decelerations.
- Suffixes** The design of the split cylindrical roller bearings (for example radial internal clearance, accuracy, cage) is specified in the designation (Z-5..ZL or F-8..ZL).  
Please contact us for further information on the bearing design.

## Design and safety guidelines

### Load limit



The loading of split bearings must be restricted.

The load limit  $P/C_r \leq 0,2$  must be observed.

$P$  kN  
Equivalent dynamic bearing load  
 $C_r$  kN  
Basic dynamic load rating.

### Axial load carrying capacity

Based on experience, the permissible axial force  $F_a$  of semi-locating and locating bearings is 10% to 20% of the radial force  $F_r$ . If higher axial forces are expected, our advisory service should be contacted for assistance.

### Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = f_s \cdot F_r$$

$P$  kN  
Equivalent dynamic bearing load  
 $f_s = 1,1$  –  
Shock factor  
 $F_r$  kN  
Radial dynamic bearing load.

### Semi-locating and locating bearings

If an axial force  $F_a$  is present in addition to the radial force  $F_r$ , the effect on the rating life must be calculated using our calculation program BEARINX®.

### Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0r}$  kN  
Radial static bearing load.

### Minimum radial load



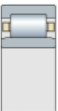
In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{0r}/60$  is necessary.

If  $F_{r \min} < C_{0r}/60$ , please contact us.

### Design of bearing arrangements

The shaft diameter and the bearing bore should match as precisely as possible. It is recommended that the shaft is machined to g6 or h6. Once the screws in the locking collars have been tightened, there is a gap at the parting lines of 0,3 mm to 0,4 mm. This gives a tight fit of the bearing inner ring.

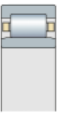
The housing bore should be machined to H6 or H7.



# Split cylindrical roller bearings

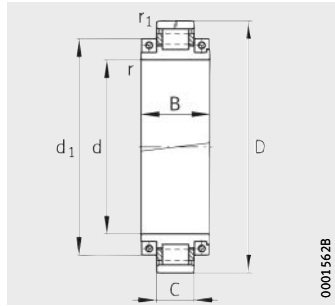
**Accuracy** The dimensional and running accuracy of the split cylindrical roller bearings of the basic design correspond to tolerance class PN to DIN 620.

**Radial internal clearance** In most cases, split cylindrical roller bearings have a radial internal clearance to internal clearance group CN. Please contact us for further information on the radial internal clearance.

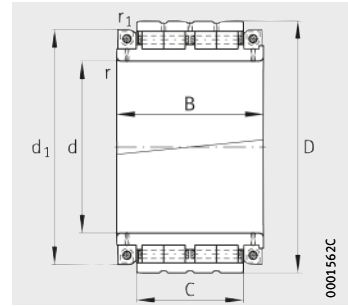


# Split cylindrical roller bearings

Single and double row  
Non-locating, semi-locating  
and locating bearings



Design 1  
Non-locating bearing



Design 1  
Non-locating bearing, four-row

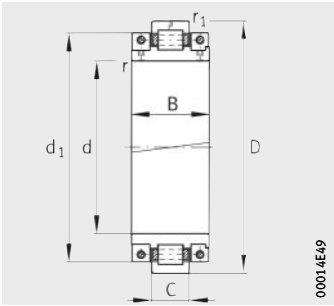
**Dimension table** - Dimensions in mm

| Designation | Design          | Mass<br>m<br>≈kg | Dimensions   |        |         |        |
|-------------|-----------------|------------------|--------------|--------|---------|--------|
|             |                 |                  | d            | D      | B       | C      |
| Z-533705.ZL | 6               | 111              | <b>279,4</b> | 430    | 203,35  | 110    |
| F-804807.ZL | 6 <sup>1)</sup> | 131              | <b>300</b>   | 558,8  | 220     | 139,7  |
| Z-521220.ZL | 1               | 50,9             | <b>304,8</b> | 438,15 | 142,875 | 74,613 |
| Z-541234.ZL | 8               | 111              | <b>350</b>   | 470    | 240     | 170    |
| Z-528438.ZL | 1               | 73,5             | <b>355,6</b> | 488,95 | 146,05  | 74,613 |
| Z-549659.ZL | 6               | 18,7             | <b>360</b>   | 440    | 80      | 38     |
| Z-577892.ZL | 8               | 89,5             | <b>360</b>   | 460    | 225     | 164    |
| Z-561001.ZL | 1               | 115              | <b>400</b>   | 600    | 160     | 90     |
| Z-577677.ZL | 8               | 289              | <b>400</b>   | 600    | 328     | 244    |
| Z-581006.ZL | 8               | 334              | <b>400</b>   | 600    | 420     | 200    |
| Z-572885.ZL | 1               | 190              | <b>400</b>   | 615,95 | 200     | 115,9  |
| Z-572886.ZL | 1               | 194              | <b>400</b>   | 615,95 | 200     | 115,9  |
| Z-543717.ZL | 1               | 73,3             | <b>406,4</b> | 546,1  | 161     | 76,2   |
| Z-579574.ZL | 6               | 224              | <b>440</b>   | 666,75 | 200     | 115,9  |
| Z-538563.ZL | 1 <sup>2)</sup> | 213              | <b>450</b>   | 600    | 275     | 200    |
| F-807475.ZL | 6               | 88,6             | <b>480</b>   | 600    | 160     | 75     |
| F-804678.ZL | 6               | 109              | <b>500</b>   | 635    | 155     | 73     |
| Z-577893.ZL | 8               | 234              | <b>500</b>   | 635    | 310     | 228    |
| Z-545148.ZL | 8               | 337              | <b>500</b>   | 680    | 332     | 220    |
| Z-546551.ZL | 6               | 760              | <b>500</b>   | 850,9  | 360     | 210    |
| Z-543852.ZL | 1               | 117              | <b>533,4</b> | 692,15 | 187     | 81     |
| Z-548795.ZL | 8               | 239              | <b>553</b>   | 700    | 260     | 184    |
| Z-563458.ZL | 8               | 255              | <b>553</b>   | 710    | 260     | 184    |
| Z-580869.ZL | 6               | 95,8             | <b>560</b>   | 680    | 142     | 72     |
| F-807125.ZL | 8               | 456              | <b>560</b>   | 730    | 460     | 350    |
| F-804627.ZL | 6               | 218              | <b>580</b>   | 750    | 257,5   | 85     |
| F-801807.ZL | 8               | 490              | <b>580</b>   | 750    | 515     | 305    |
| F-804300.ZL | 8               | 307              | <b>600</b>   | 735    | 380     | 278    |
| Z-577936.ZL | 8               | 432              | <b>600</b>   | 775    | 380     | 278    |
| Z-567618.ZL | 6               | 200              | <b>610</b>   | 775    | 190     | 88     |
| Z-572298.ZL | 1               | 202              | <b>610</b>   | 775    | 190     | 100    |

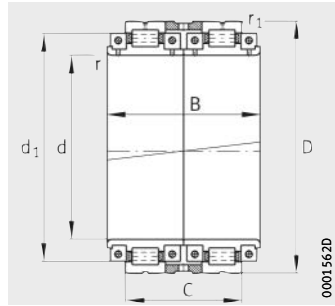
1) Outer ring split (in vee-shape).

2) Four-row.



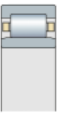


Design 6  
Locating bearing



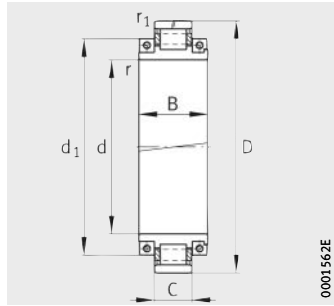
Design 8  
Locating bearing

| d <sub>1</sub> | r   | r <sub>1</sub> | Basic load ratings           |                                | Fatigue limit load    |
|----------------|-----|----------------|------------------------------|--------------------------------|-----------------------|
|                |     |                | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | C <sub>ur</sub><br>kN |
| 378            | 6   | 6              | 1 460                        | 2 600                          | 270                   |
| 440            | 12  | 4              | 2 400                        | 3 400                          | 325                   |
| –              | 2,4 | 3,2            | 815                          | 1 530                          | 134                   |
| 433            | 5   | 5              | 1 900                        | 4 750                          | 470                   |
| 443            | 2   | 2              | 915                          | 1 900                          | 182                   |
| –              | 3   | 3              | 415                          | 880                            | 71                    |
| 433            | 4   | 4              | 1 160                        | 2 900                          | 280                   |
| –              | 5   | 5              | 1 630                        | 2 500                          | 198                   |
| –              | 5   | 5              | 2 240                        | 4 300                          | 335                   |
| 549            | 7,5 | 3              | 3 100                        | 7 800                          | 730                   |
| 508            | 5   | 5              | 2 080                        | 3 750                          | 350                   |
| 508            | 5   | 5              | 2 080                        | 3 750                          | 350                   |
| –              | 2   | 2              | 1 160                        | 2 320                          | 186                   |
| 580            | 3   | 3              | 2 200                        | 4 150                          | 380                   |
| –              | 5   | 5              | 2 850                        | 7 650                          | 640                   |
| 565            | 3   | 3              | 1 060                        | 2 500                          | 223                   |
| 600            | 8   | 5              | 1 290                        | 2 900                          | 260                   |
| 600            | 8   | 5              | 2 240                        | 5 850                          | 520                   |
| 622            | 12  | 5              | 3 200                        | 8 150                          | 730                   |
| –              | 12  | 5              | 5 300                        | 9 300                          | 780                   |
| –              | 2   | 2              | 1 120                        | 2 280                          | 178                   |
| 668            | 3   | 3              | 2 750                        | 8 150                          | 710                   |
| 668            | 3   | 3              | 2 750                        | 8 150                          | 710                   |
| 645            | 3   | 3              | 1 250                        | 3 200                          | 280                   |
| 678            | 8   | 5              | 3 750                        | 10 000                         | 850                   |
| –              | 5   | 5              | 1 730                        | 3 900                          | 330                   |
| –              | 18  | 5              | 3 000                        | 7 800                          | 660                   |
| 690            | 6   | 6              | 3 000                        | 8 800                          | 750                   |
| 720            | 15  | 6              | 3 250                        | 9 000                          | 750                   |
| 720            | 5   | 5              | 1 900                        | 4 500                          | 380                   |
| 730            | 5   | 5              | 1 900                        | 4 500                          | 380                   |

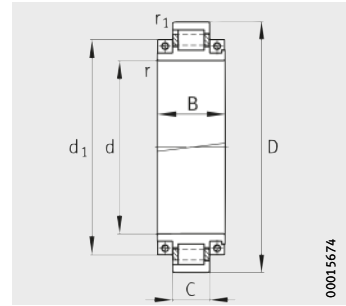


# Split cylindrical roller bearings

Single and double row  
Non-locating, semi-locating  
and locating bearings



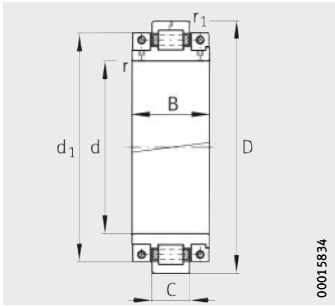
Design 1  
Non-locating bearing



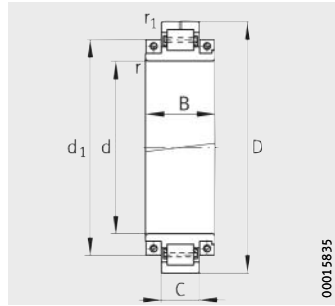
Design 3  
Semi-locating bearing

**Dimension table** (continued) · Dimensions in mm

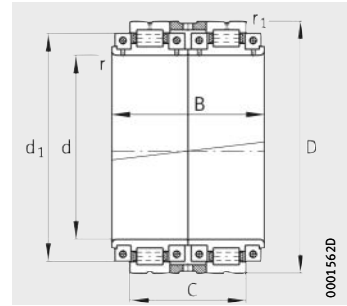
| Designation    | Design | Mass<br>m<br>≈kg | Dimensions |      |     |     |
|----------------|--------|------------------|------------|------|-----|-----|
|                |        |                  | d          | D    | B   | C   |
| Z-526783.01.ZL | 1      | 190              | 630        | 794  | 190 | 88  |
| Z-526783.02.ZL | 1      | 200              | 630        | 794  | 190 | 88  |
| Z-526783.03.ZL | 6      | 193              | 630        | 794  | 190 | 88  |
| Z-549642.ZL    | 6      | 191              | 630        | 794  | 190 | 88  |
| Z-548937.ZL    | 1      | 231              | 630        | 850  | 172 | 100 |
| Z-548907.ZL    | 1      | 277              | 630        | 850  | 230 | 128 |
| Z-568614.ZL    | 6      | 209              | 640        | 805  | 190 | 88  |
| Z-574879.ZL    | 8      | 425              | 640        | 805  | 380 | 290 |
| Z-579611.ZL    | 8      | 350              | 650        | 785  | 310 | 228 |
| Z-573047.ZL    | 6      | 694              | 650        | 940  | 320 | 200 |
| Z-573048.ZL    | 1      | 669              | 650        | 940  | 320 | 200 |
| F-809831.ZL    | 6      | 720              | 650        | 980  | 320 | 200 |
| F-809832.ZL    | 1      | 706              | 650        | 980  | 320 | 200 |
| Z-525120.ZL    | 1      | 115              | 670        | 820  | 120 | 69  |
| Z-556785.ZL    | 3      | 117              | 670        | 820  | 120 | 69  |
| Z-526784.01.ZL | 1      | 203              | 690        | 864  | 196 | 94  |
| Z-577902.ZL    | 8      | 531              | 690        | 865  | 390 | 284 |
| Z-514893.ZL    | 1      | 158              | 710        | 870  | 140 | 76  |
| F-809613.ZL    | 8      | 447              | 710        | 880  | 380 | 290 |
| Z-522468.ZL    | 7      | 260              | 750        | 920  | 185 | 106 |
| Z-578276.ZL    | 8      | 550              | 750        | 920  | 400 | 300 |
| Z-514128.ZL    | 1      | 541              | 750        | 940  | 210 | 128 |
| Z-523125.ZL    | 7      | 325              | 750        | 940  | 210 | 128 |
| F-801623.01.ZL | 6      | 220              | 775        | 945  | 165 | 80  |
| F-809722.ZL    | 8      | 470              | 775        | 945  | 330 | 245 |
| Z-529031.01.ZL | 7      | 470              | 799,8      | 1080 | 210 | 128 |
| F-801572.ZL    | 8      | 552              | 820        | 990  | 380 | 290 |



Design 6  
Locating bearing

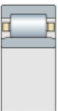


Design 7  
With pin cage  
Locating bearing



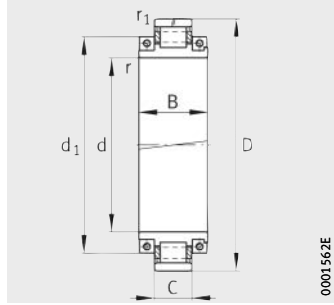
Design 8  
Locating bearing

| d <sub>1</sub> | r   | r <sub>1</sub> | Basic load ratings           |                                | Fatigue limit load    |
|----------------|-----|----------------|------------------------------|--------------------------------|-----------------------|
|                |     |                | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | C <sub>ur</sub><br>kN |
| 740            | 5   | 2              | 1900                         | 4 650                          | 390                   |
| 740            | 16  | 3              | 1900                         | 4 650                          | 390                   |
| 740            | 5   | 2              | 1900                         | 4 650                          | 390                   |
| 740            | 5   | 5              | 1900                         | 4 650                          | 390                   |
| 738            | 6   | 6              | 2 280                        | 4 650                          | 390                   |
| –              | 6   | 6              | 2 800                        | 6 100                          | 455                   |
| 750            | 5   | 5              | 1 960                        | 4 650                          | 390                   |
| 750            | 5   | 5              | 3 750                        | 11 000                         | 920                   |
| –              | 5   | 5              | 2 500                        | 7 350                          | 530                   |
| 810            | 6   | 6              | 5 600                        | 11 800                         | 960                   |
| 810            | 6   | 6              | 5 600                        | 11 800                         | 960                   |
| 835            | 6   | 6              | 5 600                        | 10 400                         | 830                   |
| 835            | 6   | 9,5            | 5 600                        | 10 400                         | 830                   |
| 760            | 4   | 4              | 1 290                        | 2 900                          | 232                   |
| 760            | 4   | 4              | 1 290                        | 2 900                          | 232                   |
| 805            | 6   | 2              | 2 240                        | 5 400                          | 440                   |
| 815            | 12  | 6              | 3 550                        | 10 200                         | 840                   |
| –              | 5   | 5              | 1 370                        | 3 150                          | 248                   |
| 822            | 12  | 6              | 3 900                        | 11 400                         | 910                   |
| –              | 7,5 | 7,5            | 2 600                        | 7 350                          | 540                   |
| 870            | 5   | 5              | 3 900                        | 12 000                         | 970                   |
| –              | 7,5 | 7,5            | 2 600                        | 7 500                          | 540                   |
| 880            | 9,5 | 7,5            | 2 900                        | 8 650                          | 560                   |
| 895            | 10  | 5              | 1 830                        | 4 550                          | 360                   |
| 895            | 10  | 5              | 3 100                        | 9 150                          | 720                   |
| –              | 9,5 | 9,5            | 4 050                        | 9 000                          | 600                   |
| –              | 5   | 5              | 4 300                        | 14 000                         | 970                   |

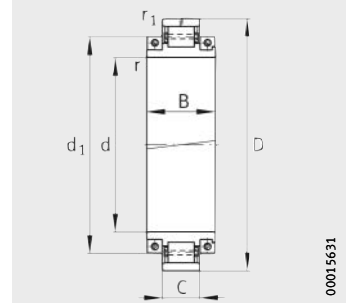


# Split cylindrical roller bearings

Single and double row  
Non-locating, semi-locating  
and locating bearings



Design 1  
Non-locating bearing

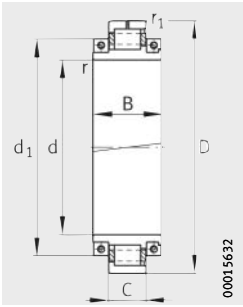


Design 2  
With pin cage  
Non-locating bearing

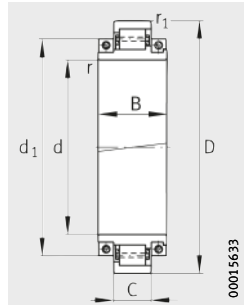
**Dimension table** (continued) · Dimensions in mm

| Designation    | Design          | Mass<br>m<br>≈kg | Dimensions   |       |       |     |
|----------------|-----------------|------------------|--------------|-------|-------|-----|
|                |                 |                  | d            | D     | B     | C   |
| Z-540908.ZL    | 4               | 205              | <b>900</b>   | 1 090 | 150   | 85  |
| Z-522292.ZL    | 1               | 213              | <b>900</b>   | 1 090 | 150   | 85  |
| Z-537876.ZL    | 4               | 189              | <b>950</b>   | 1 150 | 160   | 90  |
| Z-527210.ZL    | 7               | 596              | <b>950</b>   | 1 220 | 220   | 128 |
| Z-525667.ZL    | 7               | 591              | <b>1 000</b> | 1 255 | 222,5 | 115 |
| Z-513201.ZL    | 2               | 667              | <b>1 000</b> | 1 255 | 240   | 150 |
| Z-533265.ZL    | 2               | 1 190            | <b>1 150</b> | 1 490 | 305   | 175 |
| Z-533266.ZL    | 7               | 1 210            | <b>1 150</b> | 1 490 | 305   | 175 |
| Z-526112.ZL    | 6 <sup>1)</sup> | 603              | <b>1 250</b> | 1 500 | 192   | 112 |
| Z-531338.01.ZL | 5               | 909              | <b>1 400</b> | 1 700 | 225   | 132 |
| Z-537179.ZL    | 1               | 1 680            | <b>1 700</b> | 2 060 | 300   | 160 |

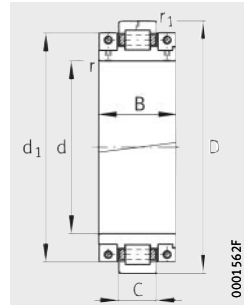
<sup>1)</sup> Without lubrication groove and lubrication hole.



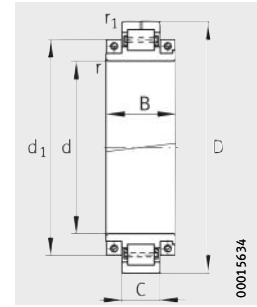
Design 4  
Semi-locating bearing



Design 5  
With pin cage  
Semi-locating bearing

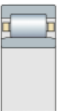


Design 6  
Locating bearing

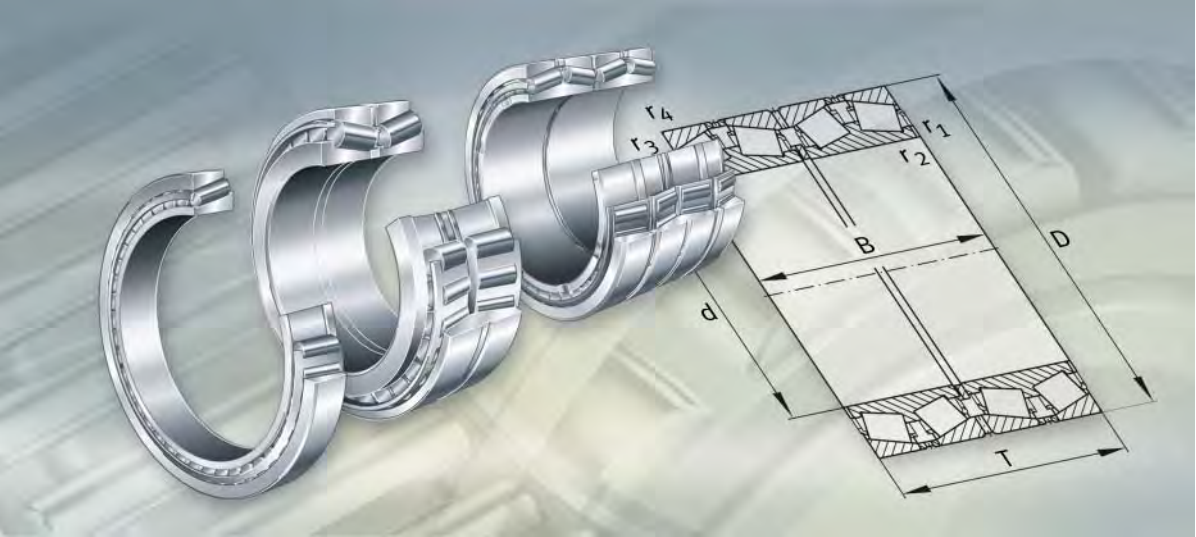


Design 7  
With pin cage  
Locating bearing

| d <sub>1</sub> | r   | r <sub>1</sub> | Basic load ratings           |                                | Fatigue limit load    |
|----------------|-----|----------------|------------------------------|--------------------------------|-----------------------|
|                |     |                | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | C <sub>ur</sub><br>kN |
| –              | 6   | 6              | 1 900                        | 4 650                          | 290                   |
| –              | 5   | 5              | 1 930                        | 4 750                          | 290                   |
| –              | 6   | 6              | 2 000                        | 4 900                          | 310                   |
| –              | 9,5 | 9,5            | 4 400                        | 10 400                         | 810                   |
| –              | 9,5 | 7,5            | 3 800                        | 10 000                         | 830                   |
| 1 168          | 6   | 6              | 4 550                        | 12 700                         | 940                   |
| 1 355          | 12  | 7,5            | 6 800                        | 17 300                         | 1 210                 |
| 1 355          | 12  | 7,5            | 6 800                        | 17 300                         | 1 210                 |
| 1 413          | 6   | 6              | 3 350                        | 8 800                          | 520                   |
| 1 570          | 6   | 6              | 5 400                        | 15 000                         | 1 020                 |
| 1 900          | 7,5 | 7,5            | 6 800                        | 18 000                         | 1 120                 |







## Tapered roller bearings

Single row  
Double row  
Four-row



# Tapered roller bearings

## **Single row tapered roller bearings** ..... 496

In some single row tapered roller bearings, the outer ring can be removed. As a result, the rings can be mounted separately. Tapered roller bearings can support high radial loads and can support axial forces in one direction. They must normally be axially adjusted against a second bearing mounted in a mirror image arrangement. Single row tapered roller bearings matched in an X arrangement can support high axial forces from both directions. In addition to bearings with standardised main dimensions (DIN 720), bearings in metric and inch sizes with non-standardised designations (Z-5..TR1 or F-8..TR1) are also available. A typical application for single row tapered roller bearings is in gearboxes.

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## **Double row tapered roller bearings** ..... 520

The bearings can support high radial and axial loads. The main dimensions and designations are not standardised in DIN and ISO.

Bearings with two outer rings and an outer intermediate ring are designed for a loose fit on the roll journal. A similar design with extended inner rings achieves a tight fit when used in conjunction with a tapered bore.

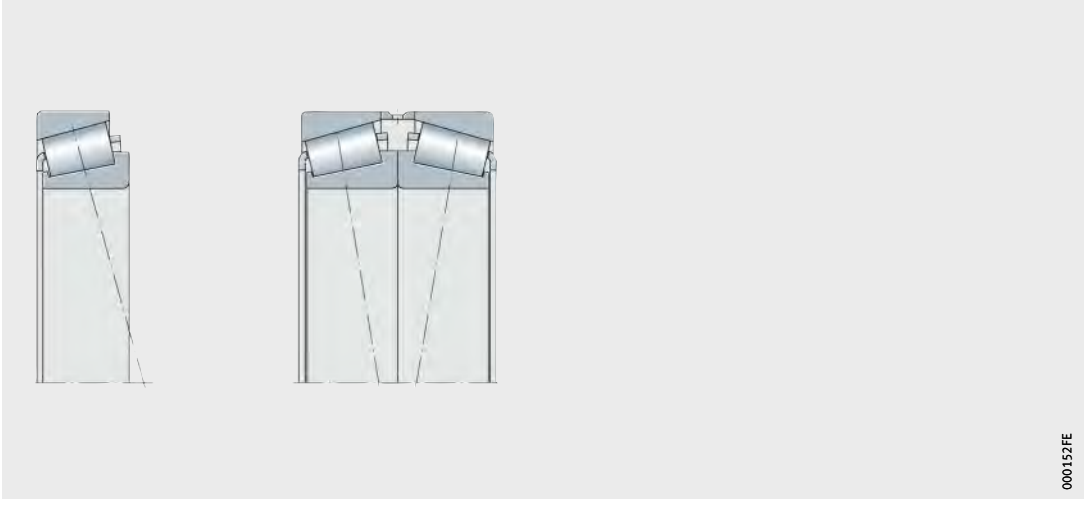
Bearings with one outer ring have two inner rings and are used, for example, as cable sheave bearings in drilling towers. Bearings with one inner intermediate ring are used, for example, in rolling mills. Double row tapered roller bearings with two outer rings, without an intermediate ring and with a particularly large contact angle are suitable for supporting very high axial forces. They are used as axial bearings, for example for work rolls or oil film bearings.

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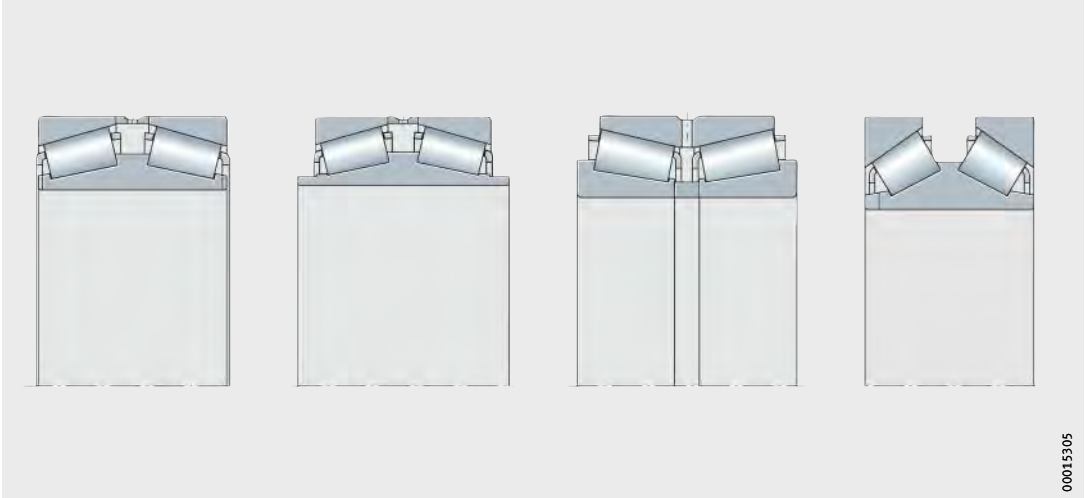
## **Four-row tapered roller bearings** ..... 556

Four-row tapered roller bearings are special bearings for rolling mills. They can support axial forces in both directions as well as very high radial forces. The bearings are separable but must be mounted as complete units in the chock before this is slid onto the roll journal. Four-row bearings with a cylindrical bore are therefore designed for a loose fit on the roll journal. Lubrication of the journal is improved in many cases by a helical groove in the bore of the inner ring. For high speeds and loads, a tight fit on the journal is necessary. In this case, we can by agreement supply four-row bearings with a tapered bore. Four-row tapered roller bearings with integral seals can achieve longer life than open bearings as a result of better lubrication and cleanliness. The main dimensions and designations are not standardised in DIN and ISO.

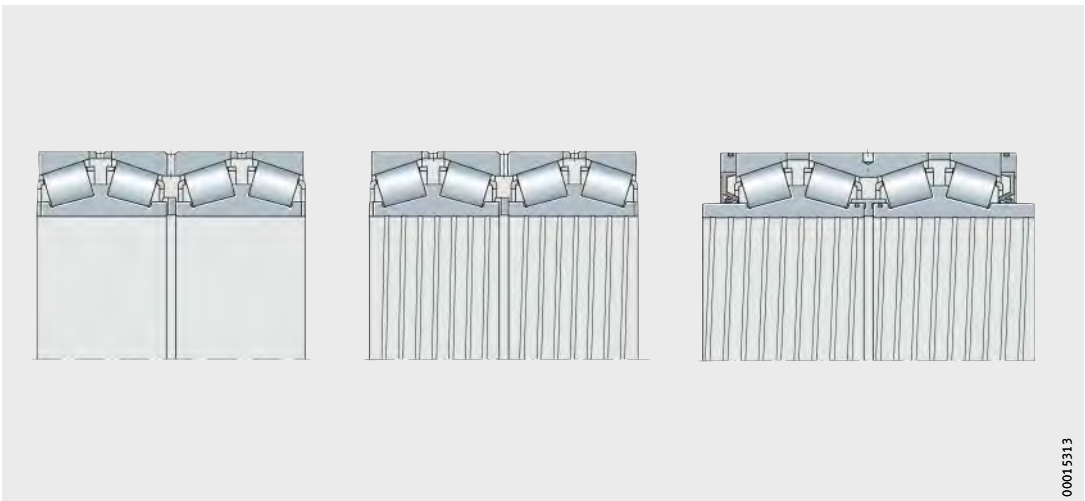




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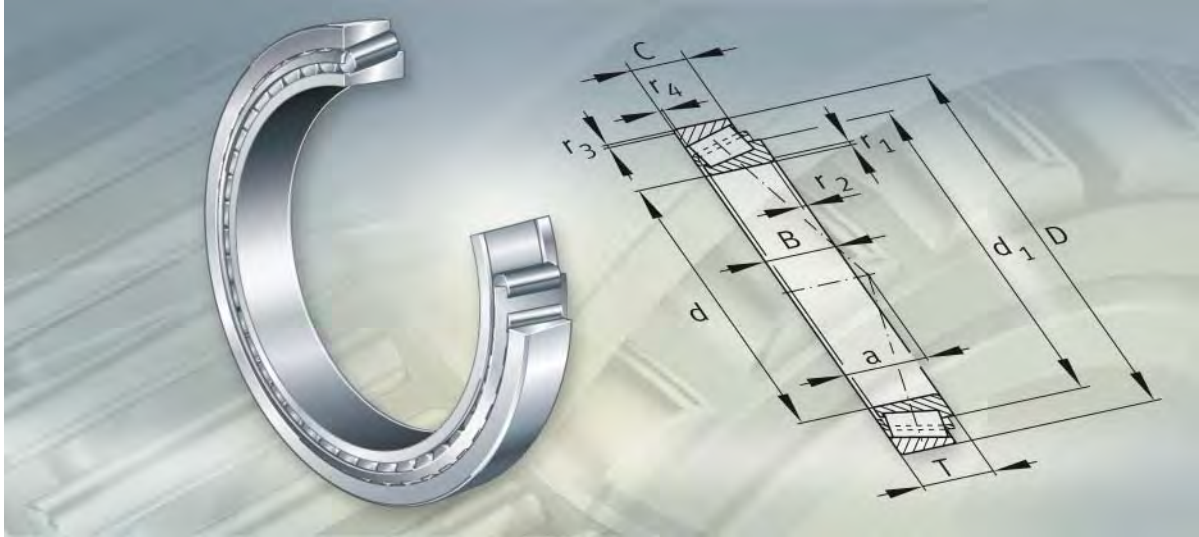


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**FAG**



**Single row tapered roller bearings**

# Single row tapered roller bearings

|                                     | Page   |
|-------------------------------------|--|
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# Product overview Single row tapered roller bearings

## Single row

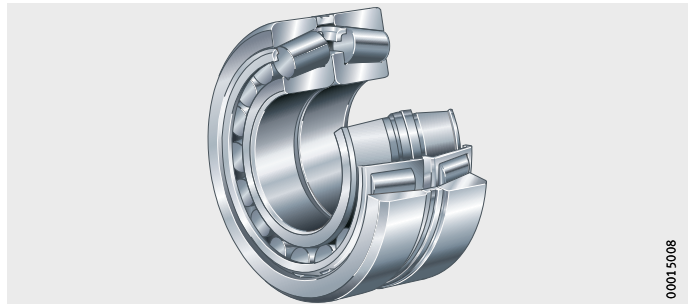
302, 303, 313, 320, 322, 323..-A, 329, Z-5..TR1, F-8..TR1



00014FE2

## Matched In X arrangement

302..-N11CA, 303..-N11CA, 313..-N11CA, 320..-N11CA,  
322..-N11CA, 323..-N11CA, 329..-N11CA



00015008

# Single row tapered roller bearings

**Features** Single row tapered roller bearings comprise solid inner and outer rings with tapered raceways and tapered rollers with cages made from pressed sheet steel.

The bearings are not self-retaining. As a result, the inner ring with the rollers and the cage can be mounted separately from the outer ring.

In addition to bearings with standardised main dimensions and standardised designations, special bearings in metric and inch sizes with non-standardised designations (Z-5..TR1 or F-8..TR1) are also available.

For new designs, bearings in metric sizes should always be used in preference.

## Radial and axial load capacity

Single row tapered roller bearings can support axial forces in one direction and high radial forces.

They must normally be axially adjusted against a second bearing mounted in a mirror image arrangement. This bearing combination is mounted in an O or X arrangement, *Figure 1* and *Figure 2*, page 501.

## Contact angle

The axial load carrying capacity is dependent on the contact angle; i.e. the larger the angle, the higher the axial load to which the bearing can be subjected.

The size of the contact angle and thus the load carrying capacity is indicated by the bearing-specific value  $e$  in the dimension tables. Bearings of series 313 have a very high axial load carrying capacity due to their particularly large contact angle.

## Compensation of angular misalignments

The modified line contact between the tapered rollers and the raceways ensures optimum stress distribution at the contact points, prevents edge stresses and allows the bearings to undergo angular adjustment.

At a load ratio  $P/C_r \leq 0,2$ , the tilting of the bearing rings relative to each other must not exceed a maximum of 4 angular minutes. For higher loads or tilting angles, please contact us.



# Single row tapered roller bearings

## Matched bearings

Tapered roller bearings with the suffix N11CA are matched in pairs in an X arrangement and can therefore support high axial forces in both directions and moment loads.

The axial internal clearance of the bearing pair is defined by a ring between the two outer rings and is indicated in the suffix, see section Axial internal clearance, page 510.

We can also supply bearing pairs by agreement matched in an O arrangement (N11BA).

When ordering, the number of bearings must be stated, not the number of bearing pairs.

## Sealing

Tapered roller bearings in either standard design or in matched pairs are not sealed.

## Lubrication

They can be lubricated using oil or grease.

## Operating temperature

Single row tapered roller bearings can be used at operating temperatures from  $-30\text{ °C}$  to  $+120\text{ °C}$ .

For continuous operating temperatures  $> +120\text{ °C}$ , please contact us.

Bearings with outside diameters of more than 240 mm are dimensionally stable up to  $+200\text{ °C}$ .

## Cages

Single row tapered roller bearings have pressed cages made from sheet steel.

Since these project laterally to a certain extent, the mounting dimensions in the dimension tables and the cage projection, page 505, must be observed.

## Suffixes

Suffixes for available designs: see table.

## Available designs

| Suffix    | Description  | Design  |
|-----------|--|---|
| A         | Modified internal construction   | Standard  |
| N11CA-A.. | Two tapered roller bearings matched in an X arrangement, with an intermediate ring between the outer rings.<br>Axial internal clearance in $\mu\text{m}$ |   |
| W209C     | Rings and rollers made from case hardening steel   |   |
| X         | External dimensions matched to international standards   |   |
| P5        | Increased accuracy   | Special design, available by agreement and in certain series only |

## Design and safety guidelines

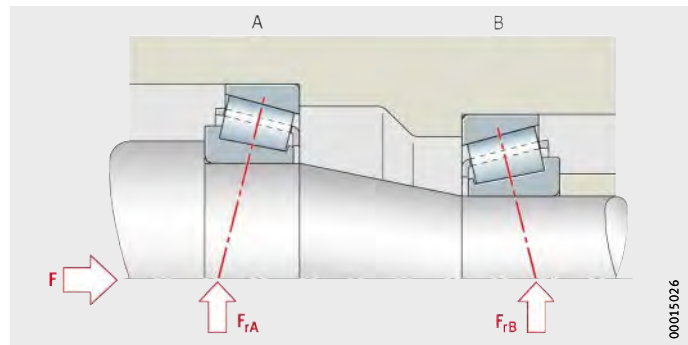
### Calculation of axial force

Under radial load, an internal axial force is induced in the bearing that must be supported by a second bearing and taken into consideration when calculating the equivalent bearing load. Depending on the bearing arrangement (O or X arrangement), the axial force must first be determined for bearings adjusted clearance-free without preload, *Figure 1* and *Figure 2* as well as the table, page 502.

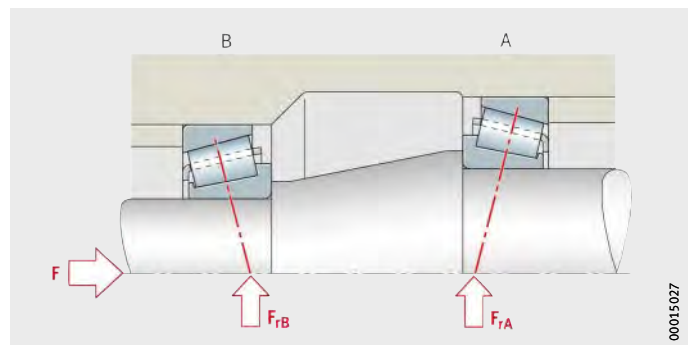
The following preconditions apply:

- The radial forces act at the central pressure points and are positive.
- Bearing A is subjected to a radial load  $F_{rA}$ , bearing B to a load  $F_{rB}$ .
- $F$  is an external axial force acting on bearing A.

*Figure 1*  
Bearings in O arrangement



*Figure 2*  
Bearings in X arrangement



# Single row tapered roller bearings

## Load ratio and axial bearing load

| Load ratio                                   |   | Axial force $F_a^{1)}$                   |  |
|--|---|--|--|
| Radial bearing load                          | External axial force  | Bearing A                                | Bearing B                                |
| $\frac{F_{rA}}{Y_A} \leq \frac{F_{rB}}{Y_B}$ | $F \geq 0$  | $F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$ | 2)                                       |
| $\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$    | $F > 0,5 \cdot \left( \frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$    | $F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$ | 2)                                       |
|  | $F \leq 0,5 \cdot \left( \frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$ | 2)                                       | $F_a = 0,5 \cdot \frac{F_{rA}}{Y_A} - F$ |

1) Axial force  $F_a$ , to be used in calculation of the equivalent dynamic bearing load.

2) If no equation is given, the axial force is not taken into consideration.



## Equivalent dynamic bearing load

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

### Single bearings under dynamic load

| Load ratio               | Equivalent dynamic load           |
|--------------------------|-----------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r$                         |
| $\frac{F_a}{F_r} > e$    | $P = 0,4 \cdot F_r + Y \cdot F_a$ |

P kN  
Equivalent dynamic bearing load for combined load  
F<sub>a</sub> kN  
Axial dynamic bearing load  
F<sub>r</sub> kN  
Radial dynamic bearing load  
e, Y –  
Factors, see dimension tables.

For bearing pairs under dynamic load in an X or O arrangement, the following applies:

### Bearing pairs under dynamic load

| Load ratio               | Equivalent dynamic load                       |
|--------------------------|---|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r + 1,12 \cdot Y \cdot F_a$            |
| $\frac{F_a}{F_r} > e$    | $P = 0,67 \cdot F_r + 1,68 \cdot Y \cdot F_a$ |

P kN  
Equivalent dynamic bearing load for combined load  
F<sub>a</sub> kN  
Axial dynamic bearing load of bearing pair  
F<sub>r</sub> kN  
Radial dynamic bearing load of bearing pair  
e, Y –  
Factors for single bearing, see dimension tables.

For matched bearing pairs under dynamic load (suffix N11CA), the following applies:

### Matched bearing pairs under dynamic load

| Load ratio               | Equivalent dynamic load              |
|--------------------------|--------------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r + Y_1 \cdot F_a$            |
| $\frac{F_a}{F_r} > e$    | $P = 0,67 \cdot F_r + Y_2 \cdot F_a$ |

P kN  
Equivalent dynamic bearing load for combined load  
F<sub>a</sub> kN  
Axial dynamic bearing load of bearing pair  
F<sub>r</sub> kN  
Radial dynamic bearing load of bearing pair  
e, Y<sub>1</sub>, Y<sub>2</sub> –  
Factors for bearing pair, see dimension tables.



# Single row tapered roller bearings

## Equivalent static bearing load

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For single bearings under static load, the following applies:

### Single bearings under static load

| Load ratio   | Equivalent static load                      |
|--|---|
| $\frac{F_{0a}}{F_{0r}} \leq \frac{1}{2 \cdot Y_0}$ | $P_0 = F_{0r}$                              |
| $\frac{F_{0a}}{F_{0r}} > \frac{1}{2 \cdot Y_0}$    | $P_0 = 0,5 \cdot F_{0r} + Y_0 \cdot F_{0a}$ |

$P_0$  kN

Equivalent static bearing load for combined load

$F_{0a}$  kN

Axial static bearing load

$F_{0r}$  kN

Radial static bearing load

$Y_0$  -

Factor, see dimension tables.

### Bearing pairs under static load

For bearing pairs under static load in an X or O arrangement, the following applies:

$$P_0 = F_{0r} + 2 \cdot Y_0 \cdot F_{0a}$$

$P_0$  kN

Equivalent static bearing load for combined load

$F_{0a}$  kN

Axial static bearing load of bearing pair

$F_{0r}$  kN

Radial static bearing load of bearing pair

$Y_0$  -

Factor for single bearing, see dimension tables.

### Matched bearing pairs under static load

For matched bearing pairs under static load (suffix N11CA), the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$  kN

Equivalent static bearing load for combined load

$F_{0a}$  kN

Axial static bearing load of bearing pair

$F_{0r}$  kN

Radial static bearing load of bearing pair

$Y_0$  -

Factor for bearing pair, see dimension tables.

## Basic load ratings and fatigue limit load for bearing pairs

If two bearings of the same size and design are mounted immediately adjacent to each other in an O or X arrangement, the basic dynamic load rating  $C_r$ , the basic static load rating  $C_{0r}$  and the fatigue limit load  $C_{ur}$  of the bearing pair are as follows:

- $C_r = 1,715 \cdot C_{r \text{ single bearing}}$
- $C_{0r} = 2 \cdot C_{0r \text{ single bearing}}$
- $C_{ur} = 2 \cdot C_{ur \text{ single bearing}}$

### Matched bearings

For matched bearing pairs (suffix N11CA), the basic load ratings are given in the dimension tables.

## Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load  $F_{r \min}$  in a radial direction. This applies particularly in the case of high speeds and high accelerations. For continuous operation, roller bearings with cage must therefore be subjected to a minimum radial load of the order of  $P/C_r \geq 0,02$ .

## Speeds



The limiting speeds  $n_G$  in the dimension tables must not be exceeded.

### Matched bearings

The limiting speed  $n_G$  is possible if the less favourable thermal balance of the bearing pair is taken into consideration in the operating conditions.

## Design of bearing arrangements Shaft and housing tolerances

### Design

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

### Mounting dimensions

The dimension tables give the maximum dimensions of the radii  $r_a$  and  $r_b$  and the diameters of the abutment shoulders.

### Cage projection



The cages project laterally to a certain extent. In order to prevent grazing, the lateral minimum distances  $C_a$  and  $C_b$  in the dimension tables must be taken into consideration in the design of the adjacent construction.



# Single row tapered roller bearings

## Accuracy

### Bearings in metric sizes

The main dimensions of the standardised bearings conform to DIN ISO 355 and DIN 720, the dimensional and running tolerances conform to DIN 620-2.

### Width tolerance to PN

Single row tapered roller bearings 303, 313, 322 and 323...-A correspond to tolerance class PN.

Bearings 320 and 329 for shaft diameters of more than 200 mm have width tolerances to tolerance class PN.

### Inner ring tolerances, Part 1

| Bore |       | Bore deviation               |      | Variation              |                         | Radial runout          |
|------|-------|------------------------------|------|------------------------|-------------------------|------------------------|
| d mm |       | $\Delta_{dmp}$ $\mu\text{m}$ |      | $V_{dp}$ $\mu\text{m}$ | $V_{dmp}$ $\mu\text{m}$ | $K_{ia}$ $\mu\text{m}$ |
| over | incl. | max.                         | min. | max.                   | max.                    | max.                   |
| 120  | 180   | 0                            | -25  | 25                     | 19                      | 35                     |
| 180  | 250   | 0                            | -30  | 30                     | 23                      | 50                     |
| 250  | 315   | 0                            | -35  | 35                     | 26                      | 60                     |
| 315  | 400   | 0                            | -40  | 40                     | 30                      | 70                     |
| 400  | 500   | 0                            | -45  | 45                     | -                       | 70                     |
| 500  | 630   | 0                            | -50  | 50                     | -                       | 85                     |
| 630  | 800   | 0                            | -75  | 75                     | -                       | 100                    |

### Inner ring tolerances, Part 2

| Bore |       | Width deviation             |      | Width deviation             |      |                              |      |                              |      |
|------|-------|-----------------------------|------|-----------------------------|------|------------------------------|------|------------------------------|------|
| d mm |       | $\Delta_{Bs}$ $\mu\text{m}$ |      | $\Delta_{Ts}$ $\mu\text{m}$ |      | $\Delta_{T1s}$ $\mu\text{m}$ |      | $\Delta_{T2s}$ $\mu\text{m}$ |      |
| over | incl. | max.                        | min. | max.                        | min. | max.                         | min. | max.                         | min. |
| 120  | 180   | 0                           | -250 | +350                        | -250 | +150                         | -150 | +200                         | -100 |
| 180  | 250   | 0                           | -300 | +350                        | -250 | +150                         | -150 | +200                         | -100 |
| 250  | 315   | 0                           | -350 | +350                        | -250 | +150                         | -150 | +200                         | -100 |
| 315  | 400   | 0                           | -400 | +400                        | -400 | +200                         | -200 | +200                         | -200 |
| 400  | 500   | 0                           | -450 | +450                        | -450 | -                            | -    | -                            | -    |
| 500  | 630   | 0                           | -500 | +500                        | -500 | -                            | -    | -                            | -    |
| 630  | 800   | 0                           | -750 | +600                        | -600 | -                            | -    | -                            | -    |

### Outer ring tolerances

| Outside diameter |       | Outside diameter deviation   |      | Variation              |                         | Radial runout          |
|------------------|-------|------------------------------|------|------------------------|-------------------------|------------------------|
| D mm             |       | $\Delta_{Dmp}$ $\mu\text{m}$ |      | $V_{Dp}$ $\mu\text{m}$ | $V_{Dmp}$ $\mu\text{m}$ | $K_{ea}$ $\mu\text{m}$ |
| over             | incl. | max.                         | min. | max.                   | max.                    | max.                   |
| 315              | 400   | 0                            | -40  | 40                     | 30                      | 70                     |
| 400              | 500   | 0                            | -45  | 45                     | 34                      | 80                     |
| 500              | 630   | 0                            | -50  | 50                     | 38                      | 100                    |
| 630              | 800   | 0                            | -75  | 75                     | -                       | 120                    |
| 800              | 1000  | 0                            | -100 | 100                    | -                       | 120                    |

The width tolerance  $\Delta_{Cs}$  is identical to  $\Delta_{Bs}$  for the inner ring of the same bearing.

### Restricted tolerance P5

We can by agreement supply tapered roller bearings with restricted tolerances to tolerance class P5 to DIN 620-2.

#### Inner ring tolerances, Part 1

| Bore |       | Bore deviation                  |      | Variation                 |                            | Radial runout             |
|------|-------|---------------------------------|------|---------------------------|----------------------------|---------------------------|
| d    | mm    | $\Delta_{dmp}$<br>$\mu\text{m}$ |      | $V_{dp}$<br>$\mu\text{m}$ | $V_{dmp}$<br>$\mu\text{m}$ | $K_{ia}$<br>$\mu\text{m}$ |
| over | incl. | max.                            | min. | max.                      | max.                       | max.                      |
| 120  | 180   | 0                               | -18  | 14                        | 9                          | 11                        |
| 180  | 250   | 0                               | -22  | 17                        | 11                         | 13                        |
| 250  | 315   | 0                               | -25  | -                         | -                          | -                         |
| 315  | 400   | 0                               | -30  | -                         | -                          | -                         |
| 400  | 500   | 0                               | -35  | -                         | -                          | -                         |
| 500  | 630   | 0                               | -40  | -                         | -                          | -                         |
| 630  | 800   | 0                               | -75  | -                         | -                          | -                         |

#### Inner ring tolerances, Part 2

| Bore |       | Width deviation                |      | Width deviation                |      |
|------|-------|--------------------------------|------|--------------------------------|------|
| d    | mm    | $\Delta_{Bs}$<br>$\mu\text{m}$ |      | $\Delta_{Ts}$<br>$\mu\text{m}$ |      |
| over | incl. | max.                           | min. | max.                           | min. |
| 120  | 180   | 0                              | -500 | +350                           | -250 |
| 180  | 250   | 0                              | -600 | +350                           | -250 |
| 250  | 315   | 0                              | -    | +350                           | -250 |
| 315  | 400   | 0                              | -    | +400                           | -400 |
| 400  | 500   | 0                              | -    | +400                           | -400 |
| 500  | 630   | 0                              | -    | +500                           | -500 |
| 630  | 800   | 0                              | -    | +600                           | -600 |

#### Outer ring tolerances

| Outside diameter |       | Outside diameter deviation      |      | Variation                 |                            | Radial runout             |
|------------------|-------|---------------------------------|------|---------------------------|----------------------------|---------------------------|
| D                | mm    | $\Delta_{Dmp}$<br>$\mu\text{m}$ |      | $V_{Dp}$<br>$\mu\text{m}$ | $V_{Dmp}$<br>$\mu\text{m}$ | $K_{ea}$<br>$\mu\text{m}$ |
| over             | incl. | max.                            | min. | max.                      | max.                       | max.                      |
| 315              | 400   | 0                               | -28  | 22                        | 14                         | 20                        |
| 400              | 500   | 0                               | -33  | -                         | -                          | 23                        |
| 500              | 630   | 0                               | -38  | -                         | -                          | 25                        |
| 630              | 800   | 0                               | -45  | -                         | -                          | 30                        |
| 800              | 1000  | 0                               | -60  | -                         | -                          | 35                        |

#### Total width tolerance of matched bearings

The total width tolerance of bearing pairs with the suffix N11CA is determined from the axial internal clearance and the deviations of the width  $\Delta_{Ts}$  of the single bearings, see table Inner ring tolerances, Part 2, page 506.



# Single row tapered roller bearings

## Bearings in inch sizes

Tapered roller bearings in inch sizes are manufactured as standard with normal tolerances to ANSI/ABMA.

The deviation of the width  $\Delta_{B_S}$  and radial runout correspond to tolerance class PN to DIN 620-2.

In contrast to the metric bearings, bearings in inch sizes have plus tolerances on the bore and outside diameter.

### Inner ring tolerances, Part 1

| Bore<br>d<br>mm |       | Bore deviation<br>$\Delta_{dmp}$<br>$\mu m$ |      | Width deviation<br>$\Delta_{T_S}$<br>$\mu m$ |      |
|-----------------|-------|---|------|--|------|
| over            | incl. | max.  | min. | max.   | min. |
| 127             | 305   | +25   | 0    | +350   | -250 |
| 305             | 508   | +50   | 0    | +375   | -375 |
| 508             | 610   | +50   | 0    | +375   | -375 |
| 610             | 915   | +75   | 0    | +375   | -375 |
| 915             | 1220  | +100  | 0    | +375   | -375 |
| 1220            | -     | +125  | 0    | +375   | -375 |

### Inner ring tolerances, Part 2

| Bore<br>d<br>mm |       | Width deviation<br>(in relation to bore)<br>$\Delta_{B_S}$<br>$\mu m$ |       | Radial runout<br>$K_{i_a}$<br>$\mu m$ |
|-----------------|-------|---|-------|---------------------------------------|
| over            | incl. | max.  | min.  | max.                                  |
| 180             | 250   | 0   | -300  | 50                                    |
| 250             | 315   | 0   | -350  | 60                                    |
| 315             | 400   | 0   | -400  | 70                                    |
| 400             | 500   | 0   | -450  | 70                                    |
| 500             | 630   | 0   | -500  | 85                                    |
| 630             | 800   | 0   | -750  | 100                                   |
| 800             | 1000  | 0   | -1000 | 120                                   |

### Outer ring tolerances, Part 1

| Outside diameter |       | Outside diameter deviation      |      |
|------------------|-------|---------------------------------|------|
| D<br>mm          |       | $\Delta_{Dmp}$<br>$\mu\text{m}$ |      |
| over             | incl. | max.                            | min. |
| –                | 305   | +25                             | 0    |
| 305              | 610   | +50                             | 0    |
| 610              | 915   | +75                             | 0    |
| 915              | 1220  | +100                            | 0    |

### Outer ring tolerances, Part 2

| Outside diameter |       | Radial runout             |
|------------------|-------|---------------------------|
| D<br>mm          |       | $K_{ea}$<br>$\mu\text{m}$ |
| over             | incl. | max.                      |
| 315              | 400   | 70                        |
| 400              | 500   | 80                        |
| 500              | 630   | 100                       |
| 630              | 800   | 120                       |
| 800              | 1000  | 120                       |
| 1000             | 1250  | 120                       |

### Chamfer dimensions for bearings in inch sizes

The values for the chamfer dimensions  $r$  apply to tapered roller bearings in inch sizes. Values for metric tapered roller bearings, see section Technical principles, table, page 118.

#### Limit values for chamfer dimensions $r_{max}$ for the inner ring

| Nominal bearing bore diameter |       | Chamfer dimension <sup>1)</sup> |             |
|-------------------------------|-------|---------------------------------|-------------|
| d<br>mm                       |       | $r_1$<br>mm                     | $r_2$<br>mm |
| over                          | incl. |                                 |             |
| 101,6                         | 254   | +0,65                           | +1,8        |

<sup>1)</sup>  $r_{min}$ : see dimension table.

#### Limit values for chamfer dimensions $r_{max}$ for the outer ring

| Nominal outside diameter |       | Chamfer dimension <sup>1)</sup> |             |
|--------------------------|-------|---------------------------------|-------------|
| D<br>mm                  |       | $r_3$<br>mm                     | $r_4$<br>mm |
| over                     | incl. |                                 |             |
| 266,7                    | 355,6 | +1,7                            | +1,7        |

<sup>1)</sup>  $r_{min}$ : see dimension table.



# Single row tapered roller bearings

## **Axial internal clearance**

In tapered roller bearings, the axial internal clearance is the result of mounting against a second bearing during installation.

### **Matched bearings**

The axial internal clearance is defined by an intermediate ring and is indicated in the suffix.

Example:

- A400-450 indicates that the axial internal clearance of the bearing pair before mounting is between 400  $\mu\text{m}$  and 450  $\mu\text{m}$ .

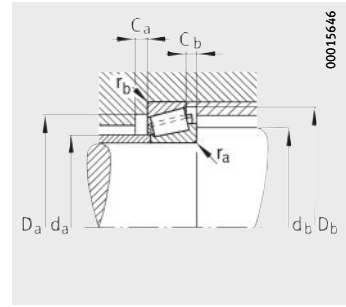
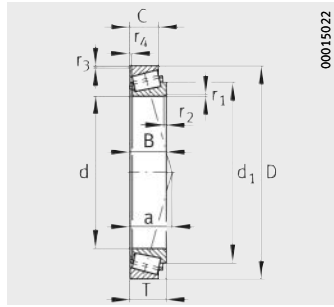
Once bearing pairs are mounted, the preset axial internal clearance is reduced by the fit conditions and the axial clamping forces.





# Tapered roller bearings

Single row



Mounting dimensions

Dimension table - Dimensions in mm

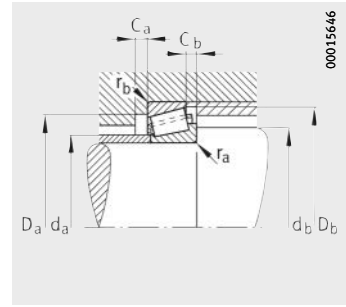
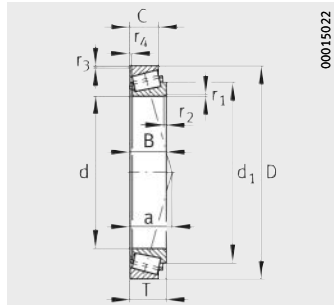
| Designation               | Mass<br>m<br>≈kg | Dimensions     |         |        |         |        |                                 |                                 |     |                |                | Mounting dimensions |  |
|---------------------------|------------------|----------------|---------|--------|---------|--------|---------------------------------|---------------------------------|-----|----------------|----------------|---------------------|--|
|                           |                  | d              | D       | T      | B       | C      | r <sub>1</sub> , r <sub>2</sub> | r <sub>3</sub> , r <sub>4</sub> | a   | d <sub>1</sub> | d <sub>a</sub> | d <sub>b</sub>      |  |
|                           |                  |                |         |        |         |        | min.                            | min.                            | ≈   | ≈              | max.           | min.                |  |
| <b>31330-X</b>            | 28               | <b>150</b>     | 320     | 82     | 75      | 50     | 5                               | 4                               | 100 | 231            | 181            | 168                 |  |
| <b>32330-A</b>            | 46,1             | <b>150</b>     | 320     | 114    | 108     | 90     | 5                               | 4                               | 79  | 230            | 184            | 167                 |  |
| <b>30332-A</b>            | 29,9             | <b>160</b>     | 340     | 75     | 68      | 58     | 5                               | 4                               | 63  | 237            | 201            | 178                 |  |
| <b>Z-536739.TR1</b>       | 34               | <b>160</b>     | 340     | 87     | 79      | 54     | 5                               | 4                               | 107 | 253            | 189            | 206                 |  |
| <b>32332</b>              | 49,5             | <b>160</b>     | 340     | 121    | 114     | 95     | 5                               | 4                               | 86  | 245            | 190            | 177                 |  |
| <b>Z-536748.01.TR1</b>    | 29,6             | <b>170</b>     | 330     | 85     | 79      | 54     | 5                               | 4                               | 103 | 253            | 191            | 218                 |  |
| <b>30334-A</b>            | 35,3             | <b>170</b>     | 360     | 80     | 72      | 62     | 5                               | 4                               | 67  | 252            | 213            | 188                 |  |
| <b>Z-529416.TR1</b>       | 39,2             | <b>170</b>     | 360     | 92     | 84      | 56     | 5                               | 4                               | 113 | 260            | 194            | 210                 |  |
| <b>32334</b>              | 61,3             | <b>170</b>     | 360     | 127    | 120     | 100    | 5                               | 4                               | 89  | 256            | 208            | 187                 |  |
| <b>30236-A</b>            | 17,9             | <b>180</b>     | 320     | 57     | 52      | 43     | 5                               | 4                               | 62  | 242            | 211            | 198                 |  |
| <b>32236-A</b>            | 30,1             | <b>180</b>     | 320     | 91     | 86      | 71     | 5                               | 4                               | 77  | 249,5          | 204            | 198                 |  |
| <b>30336</b>              | 40,9             | <b>180</b>     | 380     | 83     | 75      | 64     | 5                               | 4                               | 69  | –              | 230            | 197                 |  |
| <b>Z-534422.TR1</b>       | 45,9             | <b>180</b>     | 380     | 97     | 88      | 60     | 5                               | 4                               | 119 | 274            | 210            | 197                 |  |
| <b>Z-534215.TR1</b>       | 30,1             | <b>190</b>     | 340     | 80     | 80      | 55     | 5                               | 4                               | 103 | 269,9          | 210            | 230                 |  |
| <b>32238-A</b>            | 39,1             | <b>190</b>     | 340     | 97     | 92      | 75     | 5                               | 4                               | 81  | 263            | 216            | 207                 |  |
| <b>Z-538034.TR1</b>       | 54,1             | <b>190</b>     | 400     | 100    | 90      | 65     | 5                               | 4                               | 115 | 292,9          | 224            | 242                 |  |
| <b>32338</b>              | 83,2             | <b>190</b>     | 400     | 140    | 132     | 109    | 6                               | 5                               | 97  | 281            | 230            | 210                 |  |
| <b>30240-A</b>            | 25,2             | <b>200</b>     | 360     | 64     | 58      | 48     | 5                               | 4                               | 69  | 272            | 237            | 217                 |  |
| <b>32240-A</b>            | 43,2             | <b>200</b>     | 360     | 104    | 98      | 82     | 5                               | 4                               | 83  | 274,5          | 226            | 217                 |  |
| <b>30340</b>              | 52,3             | <b>200</b>     | 420     | 89     | 80      | 67     | 6                               | 5                               | 76  | 294            | 250            | 220                 |  |
| <b>Z-538035.TR1</b>       | 65,1             | <b>200</b>     | 420     | 110    | 100     | 70     | 5                               | 4                               | 130 | 308,6          | 229            | 250                 |  |
| <b>Z-514561.TR1</b>       | 33,4             | <b>206,375</b> | 336,55  | 98,425 | 100,012 | 77,788 | 3,3                             | 3,3                             | 74  | 271,7          | 227            | 231                 |  |
| <b>Z-514561.TR1-W209C</b> | 33,3             | <b>206,375</b> | 336,55  | 98,425 | 100,012 | 77,788 | 3,3                             | 3,3                             | 74  | 271,7          | 227            | 231                 |  |
| <b>32044-X</b>            | 24,3             | <b>220</b>     | 340     | 76     | 76      | 57     | 4                               | 3                               | 73  | 280            | 243            | 234                 |  |
| <b>Z-534216.TR1</b>       | 44,8             | <b>220</b>     | 400     | 90     | 90      | 62     | 5                               | 4                               | 118 | 313            | 249            | 266                 |  |
| <b>32244-A</b>            | 59,5             | <b>220</b>     | 400     | 114    | 108     | 90     | 5                               | 4                               | 95  | 310,5          | 258            | 237                 |  |
| <b>Z-531856.TR1</b>       | 47               | <b>230</b>     | 425     | 85     | 78      | 50     | 6                               | 6                               | 133 | 330,5          | 53             | 54                  |  |
| <b>Z-536377.TR1</b>       | 22,8             | <b>234,95</b>  | 355,6   | 68,263 | 66,675  | 47,625 | 7                               | 3,3                             | 86  | 295,9          | 249            | 265                 |  |
| <b>32948</b>              | 11,1             | <b>240</b>     | 320     | 51     | 51      | 39     | 3                               | 2,5                             | 65  | 281            | 254            | 252                 |  |
| <b>32048-X</b>            | 25,9             | <b>240</b>     | 360     | 76     | 76      | 57     | 4                               | 3                               | 79  | 300            | 261            | 254                 |  |
| <b>30248</b>              | 48               | <b>240</b>     | 440     | 79     | 72      | 60     | 5                               | 4                               | 76  | 325            | 285            | 257                 |  |
| <b>32248-A</b>            | 80,5             | <b>240</b>     | 440     | 127    | 120     | 100    | 5                               | 4                               | 105 | 332            | 286            | 257                 |  |
| <b>30348</b>              | 88,6             | <b>240</b>     | 500     | 105    | 95      | 80     | 6                               | 5                               | 90  | 347,5          | 296            | 260                 |  |
| <b>Z-501927.TR1</b>       | 21,3             | <b>254</b>     | 358,775 | 71,438 | 71,438  | 53,975 | 3,6                             | 3,3                             | 65  | 302            | 270            | 274                 |  |
| <b>Z-521849.TR1</b>       | 14,5             | <b>257,175</b> | 342,9   | 57,15  | 57,15   | 44,45  | 6,4                             | 3,3                             | 72  | 301,5          | 269            | 281                 |  |

|                |      |                |                |                |                |                | Basic load ratings  |                       | Calculation factors |      |                | Fatigue limit load | Limiting speed    | Reference speed   | Interchange designation to ISO 355 |
|----------------|------|----------------|----------------|----------------|----------------|----------------|---------------------|-----------------------|---------------------|------|----------------|--------------------|-------------------|-------------------|------------------------------------|
| D <sub>a</sub> |      | D <sub>b</sub> | C <sub>a</sub> | C <sub>b</sub> | r <sub>a</sub> | r <sub>b</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | e                   | Y    | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |                                    |
| min.           | max. | min.           | min.           | min.           | max.           | max.           | kN                  | kN                    |                     |      |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |                                    |
| 251            | 302  | 300            | 9              | 32             | 5              | 4              | 790                 | 1040                  | 0,83                | 0,73 | 0,4            | 115                | 2240              | 1530              | T7GB150                            |
| 264            | 302  | 299            | 12             | 24             | 5              | 4              | 1330                | 1950                  | 0,35                | 1,74 | 0,96           | 221                | 2240              | 1320              | –                                  |
| 290            | 322  | 310            | 9              | 17             | 5              | 4              | 890                 | 1140                  | 0,35                | 1,74 | 0,96           | 123                | 2240              | 1510              | T2GB160                            |
| 268            | –    | 321            | 9              | 33             | 5              | 4              | 890                 | 1190                  | 0,83                | 0,73 | 0,4            | 128                | 2200              | –                 | –                                  |
| 280            | –    | 320            | 12             | 26             | 5              | 4              | 1170                | 1740                  | 0,38                | 1,58 | 0,87           | 194                | 2100              | 1390              | –                                  |
| 260            | –    | 311            | 9              | 31             | 5              | 4              | 810                 | 1150                  | 0,8                 | 0,75 | 0,41           | 126                | 2100              | –                 | –                                  |
| 307            | 342  | 329            | 9              | 18             | 5              | 4              | 1040                | 1360                  | 0,35                | 1,74 | 0,96           | 146                | 2100              | 1350              | –                                  |
| 304            | –    | 336            | 9              | 30             | 5              | 4              | 1010                | 1360                  | 0,83                | 0,73 | 0,4            | 145                | 2000              | –                 | –                                  |
| 295            | –    | 335            | 12             | 27             | 5              | 4              | 1640                | 2550                  | 0,36                | 1,67 | 0,92           | 280                | 1960              | 1090              | –                                  |
| 278            | 302  | 297            | 9              | 14             | 5              | 4              | 610                 | 850                   | 0,45                | 1,33 | 0,73           | 93                 | 2240              | 1500              | T4GB180                            |
| 267            | 302  | 303            | 10             | 20             | 5              | 4              | 1010                | 1640                  | 0,45                | 1,33 | 0,73           | 187                | 2100              | 1230              | T4GD180                            |
| 327            | –    | 350            | 10             | 19             | 5              | 4              | 1120                | 1470                  | 0,35                | 1,74 | 0,96           | 155                | 1960              | 1260              | –                                  |
| 297            | –    | 356            | 10             | 37             | 5              | 4              | 1100                | 1500                  | 0,83                | 0,73 | 0,4            | 158                | 1800              | –                 | –                                  |
| 269            | –    | 320            | 12             | 25             | 5              | 4              | 810                 | 1310                  | 0,78                | 0,77 | 0,42           | 144                | 2000              | –                 | –                                  |
| 286            | 322  | 323            | 10             | 22             | 5              | 4              | 1140                | 1820                  | 0,44                | 1,38 | 0,76           | 203                | 1960              | 1260              | T4GD190                            |
| 314            | –    | 370            | 11             | 35             | 5              | 4              | 1170                | 1620                  | 0,73                | 0,82 | 0,45           | 169                | 1700              | –                 | –                                  |
| 330            | –    | 373            | 14             | 31             | 6              | 5              | 1960                | 2950                  | 0,35                | 1,73 | 0,95           | 315                | 1680              | 970               | –                                  |
| 315            | 342  | 336            | 9              | 16             | 5              | 4              | 760                 | 1060                  | 0,44                | 1,38 | 0,76           | 113                | 1960              | 1300              | T4GB200                            |
| 302            | 342  | 340            | 11             | 22             | 5              | 4              | 1320                | 2080                  | 0,41                | 1,48 | 0,81           | 225                | 1960              | 1060              | T3GD200                            |
| 360            | –    | 385            | 10             | 22             | 6              | 5              | 1300                | 1720                  | 0,35                | 1,74 | 0,96           | 174                | 1680              | 1110              | –                                  |
| 328            | –    | 395            | 12             | 40             | 5              | 4              | 1390                | 1890                  | 0,79                | 0,76 | 0,42           | 192                | 1500              | –                 | –                                  |
| 306            | –    | 318            | 8,5            | 14,5           | 3,3            | 3,3            | 1120                | 2000                  | 0,34                | 1,78 | 0,98           | 223                | 2000              | –                 | –                                  |
| 306            | –    | 317,7          | 10             | 16,5           | 3,3            | 3,3            | 1120                | 2000                  | 0,34                | 1,78 | 0,98           | 223                | 2000              | –                 | –                                  |
| 300            | 326  | 326            | 12             | 19             | 4              | 3              | 890                 | 1630                  | 0,43                | 1,39 | 0,77           | 179                | 1820              | 1130              | T4FD220                            |
| 321            | –    | 376            | 10             | 28             | 5              | 4              | 1020                | 1570                  | 0,75                | 0,8  | 0,44           | 164                | 1500              | –                 | –                                  |
| 336            | 382  | 380            | 12             | 24             | 5              | 4              | 1540                | 2550                  | 0,44                | 1,38 | 0,76           | 270                | 1540              | 910               | –                                  |
| 68,4           | –    | 78,6           | 9              | 35             | 6              | 6              | 950                 | 1440                  | 0,88                | 0,68 | 0,37           | 146                | 1400              | –                 | –                                  |
| 318            | –    | 333            | 7              | 21             | 7              | 3,3            | 660                 | 1310                  | 0,59                | 1,02 | 0,56           | 144                | 1800              | –                 | –                                  |
| 294            | 308  | 311            | 9              | 12             | 3              | 2,5            | 510                 | 1050                  | 0,46                | 1,31 | 0,72           | 116                | 1960              | 1160              | T4EC240                            |
| 318            | 346  | 346            | 12             | 19             | 4              | 3              | 900                 | 1680                  | 0,46                | 1,31 | 0,72           | 181                | 1680              | 1060              | T4FD240                            |
| 383            | –    | 410            | 10             | 19             | 5              | 4              | 870                 | 1260                  | 0,36                | 1,68 | 0,92           | 126                | 1540              | 1120              | –                                  |
| 372            | 422  | 415            | 14             | 27             | 5              | 4              | 1850                | 3100                  | 0,44                | 1,38 | 0,76           | 320                | 1400              | 800               | –                                  |
| 425            | –    | 454            | 12             | 25             | 6              | 5              | 1780                | 2410                  | 0,35                | 1,74 | 0,96           | 232                | 1330              | 870               | –                                  |
| 335            | –    | 343            | 8              | 17             | 3,6            | 3,3            | 800                 | 1560                  | 0,34                | 1,76 | 0,97           | 168                | 1700              | –                 | –                                  |
| 322            | –    | 333            | 6              | 12             | 6,4            | 3,3            | 500                 | 1150                  | 0,46                | 1,29 | 0,71           | 126                | 1800              | –                 | –                                  |



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

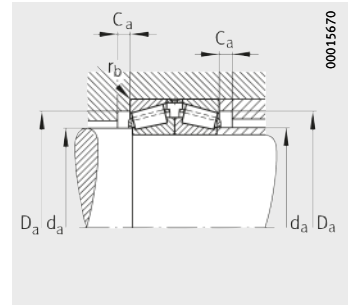
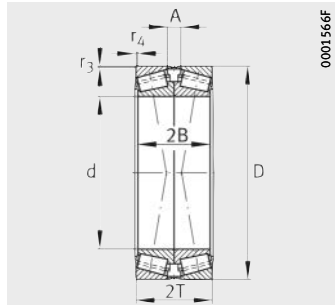
| Designation            | Mass<br>m<br>≈kg | Dimensions     |         |         |         |        |   |   |        |                     | Mounting dimensions    |                        |
|------------------------|------------------|----------------|---------|---------|---------|--------|---|---|--------|---------------------|------------------------|------------------------|
|                        |                  | d              | D       | T       | B       | C      | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. | a<br>≈ | d <sub>1</sub><br>≈ | d <sub>a</sub><br>max. | d <sub>b</sub><br>min. |
| <b>32952</b>           | 18,7             | <b>260</b>     | 360     | 63,5    | 63,5    | 48     | 3                                       | 2,5                                     | 70     | 309                 | 279                    | 272                    |
| <b>32052-X</b>         | 41,1             | <b>260</b>     | 400     | 87      | 87      | 65     | 5                                       | 4                                       | 86     | 331,5               | 287                    | 278                    |
| <b>30252-A</b>         | 62,2             | <b>260</b>     | 480     | 89      | 80      | 67     | 6                                       | 5                                       | 89     | 357                 | 310                    | 280                    |
| <b>Z-507531.TR1</b>    | 29,6             | <b>260,35</b>  | 400,05  | 69,85   | 67,47   | 46,038 | 9,7                                     | 6,4                                     | 76     | 320,7               | 280                    | 296                    |
| <b>F-807586.TR1</b>    | 15,7             | <b>262</b>     | 355,6   | 57,15   | 57,15   | 44,45  | 3,6                                     | 3,3                                     | 61     | 312,5               | 281                    | 285                    |
| <b>Z-534990.TR1</b>    | 5,72             | <b>263,525</b> | 325,438 | 28,575  | 28,575  | 25,4   | 1,5                                     | 1,5                                     | 48     | 295                 | 277                    | 277                    |
| <b>32956</b>           | 19,9             | <b>280</b>     | 380     | 63,5    | 63,5    | 48     | 3                                       | 2,5                                     | 75     | 330                 | 298                    | 292                    |
| <b>32056-X</b>         | 40,5             | <b>280</b>     | 420     | 87      | 87      | 65     | 5                                       | 4                                       | 91     | 349                 | 305                    | 298                    |
| <b>32256</b>           | 112              | <b>280</b>     | 500     | 137     | 130     | 106    | 6                                       | 5                                       | 117    | 390                 | 322                    | 300                    |
| <b>32960</b>           | 31,4             | <b>300</b>     | 420     | 76      | 76      | 57     | 4                                       | 3                                       | 80     | 362                 | 324                    | 314                    |
| <b>32260</b>           | 139              | <b>300</b>     | 540     | 149     | 140     | 115    | 6                                       | 5                                       | 127    | 409,5               | 346                    | 320                    |
| <b>32964</b>           | 33,5             | <b>320</b>     | 440     | 76      | 76      | 57     | 4                                       | 3                                       | 86     | 382                 | 343                    | 334                    |
| <b>32064-X</b>         | 60,5             | <b>320</b>     | 480     | 100     | 100     | 74     | 5                                       | 4                                       | 104    | 397,5               | 350                    | 338                    |
| <b>32264</b>           | 170              | <b>320</b>     | 580     | 159     | 150     | 125    | 6                                       | 5                                       | 136    | 439                 | 372                    | 340                    |
| <b>32968</b>           | 35,5             | <b>340</b>     | 460     | 76      | 76      | 57     | 4                                       | 3                                       | 91     | 404                 | 361                    | 354                    |
| <b>32972</b>           | 37,1             | <b>360</b>     | 480     | 76      | 76      | 57     | 4                                       | 3                                       | 97     | 423                 | 380                    | 374                    |
| <b>Z-538300.TR1</b>    | 19,1             | <b>381</b>     | 479,425 | 49,212  | 47,625  | 34,925 | 6,4                                     | 3,3                                     | 75     | 429                 | 395                    | 406                    |
| <b>Z-531341.01.TR1</b> | 76,6             | <b>384,175</b> | 546,1   | 104,775 | 104,775 | 82,55  | 6,4                                     | 6,4                                     | 98     | 459,5               | 407                    | 417                    |
| <b>Z-580755.TR1</b>    | 6,68             | <b>403,225</b> | 460,375 | 28,575  | 28,575  | 20,638 | 3,5                                     | 3,3                                     | 70     | 431,1               | 414                    | 418                    |
| <b>Z-511041.TR1</b>    | 27,2             | <b>406,4</b>   | 508     | 61,912  | 61,912  | 47,625 | 3,3                                     | 3,3                                     | 83     | 455                 | 423                    | 426                    |
| <b>Z-507170.TR1</b>    | 43,3             | <b>406,4</b>   | 546,1   | 76,2    | 61,12   | 55,562 | 6,4                                     | 6,4                                     | 113    | 469                 | 425                    | 435                    |
| <b>Z-532528.TR1</b>    | 93,4             | <b>415,925</b> | 590,55  | 114,3   | 114,3   | 88,9   | 6,4                                     | 6,4                                     | 105    | 492                 | 441                    | 451                    |
| <b>Z-526434.TR1</b>    | 115              | <b>447,675</b> | 635     | 120,65  | 120,65  | 95,25  | 6,4                                     | 6,4                                     | 111    | 534,9               | 474                    | 484                    |
| <b>Z-531546.TR1</b>    | 68,1             | <b>482,6</b>   | 634,873 | 80,962  | 80,962  | 63,5   | 6,4                                     | 3,3                                     | 116    | 564                 | 510                    | 516                    |
| <b>Z-535194.TR1</b>    | 56,7             | <b>498,475</b> | 634,873 | 80,962  | 80,962  | 63,5   | 6,4                                     | 3,3                                     | 116    | 564                 | 524                    | 529                    |
| <b>Z-533416.TR1</b>    | 115              | <b>558,8</b>   | 736,6   | 104,775 | 104,775 | 80,962 | 6,4                                     | 6,4                                     | 121    | 645                 | 585                    | 594                    |
| <b>Z-521901.TR1</b>    | 110              | <b>609,6</b>   | 787,4   | 93,662  | 93,662  | 69,85  | 6,4                                     | 6,4                                     | 156    | 699,5               | 633                    | 642                    |
| <b>F-808306.TR1</b>    | 99,2             | <b>620</b>     | 800     | 85      | 78      | 54     | 6                                       | 5                                       | 244    | 723                 | 654                    | 676                    |
| <b>Z-507596.TR1</b>    | 90,6             | <b>670</b>     | 820     | 88      | 80      | 68     | 6                                       | 4                                       | 182    | 745                 | 696                    | 720                    |
| <b>Z-510362.TR1</b>    | 118              | <b>723,9</b>   | 914,4   | 84,138  | 80,962  | 60,325 | 5,6                                     | 6,4                                     | 138    | 809                 | 750                    | 756                    |
| <b>Z-534835.TR1</b>    | 67               | <b>760</b>     | 889     | 69,85   | 69,85   | 51,18  | 3,3                                     | 3,3                                     | 147    | 822,3               | 779                    | 783                    |
| <b>F-808307.TR1</b>    | 235              | <b>850</b>     | 1 090   | 115     | 106     | 77     | 7,5                                     | 7,5                                     | 218    | 963                 | 900                    | 918                    |
| <b>F-808305.TR1</b>    | 319              | <b>1 000</b>   | 1 250   | 115     | 115     | 85     | 9,5                                     | 9,5                                     | 180    | 1 110               | 1 058                  | 1 070                  |

|                |      |                |                |                |                |                |                     | Basic load ratings    |      | Calculation factors |                |                 | Fatigue limit load | Limiting speed    | Reference speed | Interchange designation to ISO 355 |
|----------------|------|----------------|----------------|----------------|----------------|----------------|---------------------|-----------------------|------|---------------------|----------------|-----------------|--------------------|-------------------|-----------------|------------------------------------|
| D <sub>a</sub> |      | D <sub>b</sub> | C <sub>a</sub> | C <sub>b</sub> | r <sub>a</sub> | r <sub>b</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | e    | Y                   | Y <sub>0</sub> | C <sub>ur</sub> | n <sub>G</sub>     | n <sub>B</sub>    |                 |                                    |
| min.           | max. | min.           | min.           | min.           | max.           | max.           | kN                  | kN                    |      |                     |                | kN              | min <sup>-1</sup>  | min <sup>-1</sup> |                 |                                    |
| 328            | 348  | 347            | 11             | 15,5           | 3              | 2,5            | 750                 | 1 500                 | 0,41 | 1,48                | 0,81           | 161             | 1 680              | 990               | T3EC260         |                                    |
| 352            | 382  | 383            | 14             | 22             | 5              | 4              | 1 150               | 2 140                 | 0,43 | 1,38                | 0,76           | 225             | 1 540              | 920               | T4FC260         |                                    |
| 419            | –    | 447            | 10             | 22             | 6              | 5              | 1 460               | 2 090                 | 0,4  | 1,48                | 0,81           | 202             | 1 330              | 860               | –               |                                    |
| 366            | –    | 371,5          | 7              | 18             | 9,7            | 6,4            | 710                 | 1 260                 | 0,44 | 1,36                | 0,75           | 132             | 1 500              | –                 | –               |                                    |
| 335            | –    | 346            | 6              | 11             | 3,6            | 3,3            | 590                 | 1 200                 | 0,36 | 1,69                | 0,93           | 129             | 1 700              | –                 | –               |                                    |
| 312            | –    | 315            | 5              | 3              | 1,5            | 1,5            | 226                 | 530                   | 0,37 | 1,64                | 0,9            | 36              | 1 800              | –                 | –               |                                    |
| 348            | 368  | 368            | 11             | 15,5           | 3              | 2,5            | 740                 | 1 520                 | 0,43 | 1,39                | 0,76           | 162             | 1 540              | 940               | T4EC280         |                                    |
| 370            | 402  | 402            | 14             | 22             | 5              | 4              | 1 200               | 2 300                 | 0,46 | 1,31                | 0,72           | 238             | 1 400              | 840               | T4FC280         |                                    |
| 418            | –    | 475            | 14             | 31             | 6              | 5              | 2 290               | 3 950                 | 0,45 | 1,34                | 0,73           | 395             | 1 190              | 660               | –               |                                    |
| 383            | 406  | 405            | 12             | 19             | 4              | 3              | 990                 | 2 030                 | 0,39 | 1,52                | 0,84           | 208             | 1 330              | 820               | T3FD300         |                                    |
| 453            | –    | 510            | 16             | 34             | 6              | 5              | 2 650               | 4 550                 | 0,43 | 1,38                | 0,76           | 445             | 1 120              | 590               | –               |                                    |
| 402            | 426  | 426            | 13             | 19             | 4              | 3              | 1 060               | 2 270                 | 0,42 | 1,44                | 0,79           | 229             | 1 260              | 740               | –               |                                    |
| 424            | 462  | 461            | 15             | 26             | 5              | 4              | 1 560               | 3 050                 | 0,46 | 1,31                | 0,72           | 305             | 1 190              | 690               | T4GD320         |                                    |
| 486            | –    | 555            | 16             | 34             | 6              | 5              | 3 000               | 5 200                 | 0,44 | 1,38                | 0,76           | 490             | 1 050              | 530               | –               |                                    |
| 421            | 446  | 446            | 12             | 19             | 4              | 3              | 1 080               | 2 370                 | 0,44 | 1,37                | 0,75           | 236             | 1 190              | 690               | –               |                                    |
| 439            | 466  | 466            | 14             | 19             | 4              | 3              | 1 060               | 2 370                 | 0,46 | 1,31                | 0,72           | 233             | 1 120              | 660               | –               |                                    |
| 455            | –    | 465            | 5              | 12             | 6,4            | 3,3            | 455                 | 1 140                 | 0,38 | 1,57                | 0,86           | 110             | 1 100              | –                 | –               |                                    |
| 507            | –    | 519            | 10             | 17,5           | 6,4            | 6,4            | 1 780               | 3 950                 | 0,33 | 1,8                 | 0,99           | 375             | 1 100              | –                 | –               |                                    |
| 445            | –    | 452            | 5              | 6              | 3,5            | 3,3            | 233                 | 670                   | 0,4  | 1,49                | 0,82           | 41              | 1 100              | –                 | –               |                                    |
| 483            | –    | 492            | 7              | 14             | 3,3            | 3,3            | 810                 | 1 980                 | 0,36 | 1,65                | 0,9            | 191             | 1 100              | –                 | –               |                                    |
| 504            | –    | 516            | –              | 16,5           | 6,4            | 6,4            | 1 030               | 2 120                 | 0,47 | 1,27                | 0,7            | 195             | 1 100              | –                 | –               |                                    |
| 549            | –    | 562,4          | 12             | 25             | 6,4            | 6,4            | 1 970               | 4 150                 | 0,34 | 1,76                | 0,97           | 385             | 950                | –                 | –               |                                    |
| 591            | –    | 610            | 10             | 20             | 6,4            | 6,4            | 2 460               | 5 200                 | 0,33 | 1,84                | 1,01           | 470             | 900                | –                 | –               |                                    |
| 603            | –    | 609            | 5              | 13,5           | 6,4            | 3,3            | 1 170               | 2 800                 | 0,43 | 1,4                 | 0,77           | 250             | 850                | –                 | –               |                                    |
| 603            | –    | 610            | 9              | 13             | 6,4            | 3,3            | 1 170               | 2 800                 | 0,43 | 1,4                 | 0,77           | 250             | 850                | –                 | –               |                                    |
| 696            | –    | 708            | 11             | 19             | 6,4            | 6,4            | 2 270               | 5 500                 | 0,35 | 1,73                | 0,95           | 470             | 700                | –                 | –               |                                    |
| 747            | –    | 756            | 10             | 19             | 6,4            | 6,4            | 1 800               | 4 500                 | 0,5  | 1,2                 | 0,66           | 380             | 670                | –                 | –               |                                    |
| 723            | –    | 776            | 13             | 31             | 6              | 5              | 1 450               | 3 550                 | 0,88 | 0,68                | 0,38           | 295             | 670                | –                 | –               |                                    |
| 770            | –    | 804            | 10             | 15             | 6              | 4              | 1 400               | 3 650                 | 0,57 | 1,05                | 0,58           | 305             | 630                | –                 | –               |                                    |
| 873            | –    | 876            | 9              | 19             | 5,6            | 6,4            | 1 980               | 4 750                 | 0,38 | 1,57                | 0,87           | 375             | 560                | –                 | –               |                                    |
| 857            | –    | 860            | 7              | 19             | 3,3            | 3,3            | 1 120               | 3 700                 | 0,43 | 1,38                | 0,76           | 300             | 560                | –                 | –               |                                    |
| 1 006          | –    | 1 047          | 13             | 38             | 7,5            | 7,5            | 2 750               | 6 800                 | 0,53 | 1,14                | 0,63           | 520             | 500                | –                 | –               |                                    |
| 1 175          | –    | 1 201          | 15             | 30             | 9,5            | 9,5            | 3 650               | 9 900                 | 0,35 | 1,72                | 0,95           | 720             | 450                | –                 | –               |                                    |



# Tapered roller bearings

Matched pairs  
in X arrangement



Mounting dimensions

Dimension table - Dimensions in mm

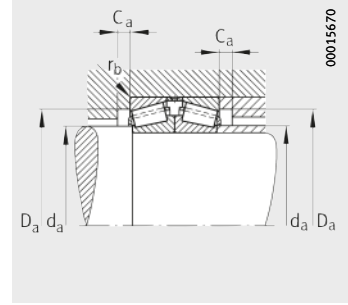
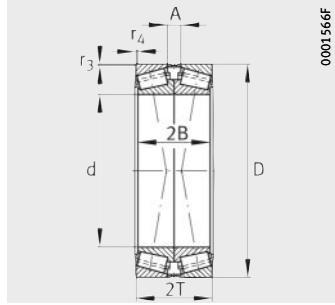
| Designation            | Mass for bearing pair<br>m<br>≈kg | Dimensions |     |     |     |   |    | Mounting dimensions    |                |      |                        |                        |
|------------------------|-----------------------------------|------------|-----|-----|-----|---|----|------------------------|----------------|------|------------------------|------------------------|
|                        |                                   | d          | D   | 2B  | 2T  | r <sub>3</sub> , r <sub>4</sub><br>min. | A  | d <sub>a</sub><br>max. | D <sub>a</sub> |      | C <sub>a</sub><br>min. | r <sub>b</sub><br>max. |
|                        |                                   |            |     |     |     |   |    |                        | min.           | max. |                        |                        |
| 30330-A-N11CA-A380-430 | 51,6                              | 150        | 320 | 130 | 144 | 4                                       | 34 | 189                    | 273            | 302  | 9                      | 4                      |
| 31330-X-N11CA          | 57,7                              | 150        | 320 | 150 | 164 | 4                                       | 64 | 181                    | 251            | 302  | 9                      | 4                      |
| 32330-A-N11CA          | 87,9                              | 150        | 320 | 216 | 228 | 4                                       | 48 | 184                    | 264            | 302  | 12                     | 4                      |
| 30332-A-N11CA          | 60,7                              | 160        | 340 | 136 | 150 | 4                                       | 34 | 201                    | 290            | 322  | 9                      | 4                      |
| 32332-N11CA            | 92,9                              | 160        | 340 | 228 | 242 | 4                                       | 52 | 190                    | 280            | 322  | 12                     | 4                      |
| 30334-A-N11CA          | 73,3                              | 170        | 360 | 144 | 160 | 4                                       | 36 | 213                    | 307            | 342  | 9                      | 4                      |
| 32334-N11CA            | 125                               | 170        | 360 | 240 | 254 | 4                                       | 54 | 208                    | 295            | 342  | 12                     | 4                      |
| 30236-A-N11CA          | 36                                | 180        | 320 | 104 | 114 | 4                                       | 28 | 211                    | 278            | 302  | 9                      | 4                      |
| 32236-A-N11CA          | 61,3                              | 180        | 320 | 172 | 182 | 4                                       | 40 | 204                    | 267            | 302  | 10                     | 4                      |
| 32236-A-N11CA-A430-480 | 61,3                              | 180        | 320 | 172 | 182 | 4                                       | 40 | 204                    | 267            | 302  | 10                     | 4                      |
| 30336-N11CA            | 83,7                              | 180        | 380 | 150 | 166 | 4                                       | 38 | 230                    | 327            | 362  | 10                     | 4                      |
| 32336-N11CA            | 128                               | 180        | 380 | 252 | 268 | 4                                       | 56 | 215                    | 310            | 362  | 14                     | 4                      |
| 30238-N11CA            | 41,9                              | 190        | 340 | 110 | 120 | 4                                       | 28 | 224                    | 298            | 322  | 9                      | 4                      |
| 32338-N11CA            | 164                               | 190        | 400 | 264 | 280 | 5                                       | 62 | 230                    | 330            | 377  | 14                     | 5                      |
| 30240-A-N11CA          | 52,9                              | 200        | 360 | 116 | 128 | 4                                       | 32 | 237                    | 315            | 342  | 9                      | 4                      |
| 30240-A-N11CA-A550-600 | 52,9                              | 200        | 360 | 116 | 128 | 4                                       | 32 | 237                    | 315            | 342  | 9                      | 4                      |
| 32240-A-N11CA          | 88,2                              | 200        | 360 | 196 | 208 | 4                                       | 44 | 226                    | 302            | 342  | 11                     | 4                      |
| 32240-A-N11CA-A400-450 | 88,2                              | 200        | 360 | 196 | 208 | 4                                       | 44 | 226                    | 302            | 342  | 11                     | 4                      |
| 30340-N11CA            | 107                               | 200        | 420 | 160 | 178 | 5                                       | 44 | 250                    | 360            | 397  | 10                     | 5                      |
| 32340-N11CA            | 168                               | 200        | 420 | 276 | 292 | 5                                       | 62 | 240                    | 345            | 397  | 14                     | 5                      |
| 32044-X-N11CA          | 49,4                              | 220        | 340 | 152 | 152 | 3                                       | 38 | 243                    | 300            | 326  | 12                     | 3                      |
| 32044-X-N11CA-A300-350 | 49,4                              | 220        | 340 | 152 | 152 | 3                                       | 38 | 243                    | 300            | 326  | 12                     | 3                      |
| 32244-A-N11CA          | 123                               | 220        | 400 | 216 | 228 | 4                                       | 48 | 258                    | 336            | 382  | 12                     | 4                      |
| 32244-A-N11CA-A400-450 | 123                               | 220        | 400 | 216 | 228 | 4                                       | 48 | 258                    | 336            | 382  | 12                     | 4                      |
| 30344-N11CA            | 136                               | 220        | 460 | 176 | 194 | 5                                       | 48 | 274                    | 392            | 437  | 10                     | 5                      |
| 32048-X-N11CA          | 58,3                              | 240        | 360 | 152 | 152 | 3                                       | 38 | 261                    | 318            | 346  | 12                     | 3                      |
| 32048-X-N11CA-A450-500 | 58,3                              | 240        | 360 | 152 | 152 | 3                                       | 38 | 261                    | 318            | 346  | 12                     | 3                      |
| 30248-N11CA            | 87,6                              | 240        | 440 | 144 | 158 | 4                                       | 38 | 285                    | 383            | 417  | 10                     | 4                      |
| 32248-A-N11CA          | 166                               | 240        | 440 | 240 | 254 | 4                                       | 54 | 286                    | 372            | 422  | 14                     | 4                      |
| 32248-A-N11CA-A450-500 | 166                               | 240        | 440 | 240 | 254 | 4                                       | 54 | 286                    | 372            | 422  | 14                     | 4                      |
| 30348-N11CA            | 177                               | 240        | 500 | 190 | 210 | 5                                       | 50 | 296                    | 425            | 477  | 12                     | 5                      |
| 32052-X-N11CA          | 77,5                              | 260        | 400 | 174 | 174 | 4                                       | 44 | 287                    | 352            | 382  | 14                     | 4                      |
| 32052-X-N11CA-A500-550 | 77,5                              | 260        | 400 | 174 | 174 | 4                                       | 44 | 287                    | 352            | 382  | 14                     | 4                      |

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>Bearing pair<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>Bearing pair<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 1 380               | 2 050                   | 0,35                | 1,96  | 2,91  | 1,91  | 225                                  | 2 240  | 1 310   |
| 1 360               | 2 090                   | 0,83                | 0,82  | 1,22  | 0,8   | 230                                  | 2 240  | 1 220   |
| 2 270               | 3 900                   | 0,35                | 1,96  | 2,91  | 1,91  | 445                                  | 2 240  | 1 060   |
| 1 520               | 2 280                   | 0,35                | 1,96  | 2,91  | 1,91  | 246                                  | 2 240  | 1 210   |
| 2 010               | 3 450                   | 0,38                | 1,78  | 2,65  | 1,74  | 385                                  | 2 100  | 1 120   |
| 1 780               | 2 700                   | 0,35                | 1,96  | 2,91  | 1,91  | 290                                  | 2 100  | 1 090   |
| 2 800               | 5 100                   | 0,36                | 1,87  | 2,79  | 1,83  | 560                                  | 1 960  | 870   |
| 1 040               | 1 700                   | 0,45                | 1,5   | 2,23  | 1,47  | 185                                  | 2 240  | 1 200   |
| 1 730               | 3 300                   | 0,45                | 1,5   | 2,23  | 1,47  | 375                                  | 2 100  | 990   |
| 1 730               | 3 300                   | 0,45                | 1,5   | 2,23  | 1,47  | 375                                  | 2 100  | 990   |
| 1 930               | 2 950                   | 0,35                | 1,96  | 2,91  | 1,91  | 310                                  | 1 960  | 1 010   |
| 2 460               | 4 350                   | 0,38                | 1,78  | 2,65  | 1,74  | 470                                  | 1 820  | 950   |
| 910                 | 1 560                   | 0,39                | 1,75  | 2,61  | 1,71  | 169                                  | 2 120  | 1 210   |
| 3 350               | 5 900                   | 0,35                | 1,95  | 2,9   | 1,91  | 630                                  | 1 680  | 780   |
| 1 300               | 2 120                   | 0,44                | 1,55  | 2,31  | 1,52  | 225                                  | 1 960  | 1 040   |
| 1 300               | 2 120                   | 0,44                | 1,55  | 2,31  | 1,52  | 225                                  | 1 960  | 1 040   |
| 2 270               | 4 150                   | 0,41                | 1,66  | 2,47  | 1,62  | 450                                  | 1 960  | 850   |
| 2 270               | 4 150                   | 0,41                | 1,66  | 2,47  | 1,62  | 450                                  | 1 960  | 850   |
| 2 230               | 3 450                   | 0,35                | 1,96  | 2,91  | 1,91  | 350                                  | 1 680  | 880   |
| 3 000               | 5 300                   | 0,37                | 1,8   | 2,69  | 1,76  | 560                                  | 1 680  | 820   |
| 1 530               | 3 250                   | 0,43                | 1,57  | 2,34  | 1,53  | 355                                  | 1 820  | 910   |
| 1 530               | 3 250                   | 0,43                | 1,57  | 2,34  | 1,53  | 355                                  | 1 820  | 910   |
| 2 650               | 5 100                   | 0,44                | 1,55  | 2,31  | 1,52  | 540                                  | 1 540  | 730   |
| 2 650               | 5 100                   | 0,44                | 1,55  | 2,31  | 1,52  | 540                                  | 1 540  | 730   |
| 2 470               | 3 750                   | 0,35                | 1,96  | 2,91  | 1,91  | 370                                  | 1 400  | 820   |
| 1 540               | 3 350                   | 0,46                | 1,47  | 2,19  | 1,44  | 360                                  | 1 680  | 850   |
| 1 540               | 3 350                   | 0,46                | 1,47  | 2,19  | 1,44  | 360                                  | 1 680  | 850   |
| 1 490               | 2 550                   | 0,36                | 1,89  | 2,81  | 1,85  | 255                                  | 1 540  | 890   |
| 3 150               | 6 200                   | 0,44                | 1,55  | 2,31  | 1,52  | 660                                  | 1 400  | 640   |
| 3 150               | 6 200                   | 0,44                | 1,55  | 2,31  | 1,52  | 660                                  | 1 400  | 640   |
| 3 050               | 4 800                   | 0,35                | 1,96  | 2,91  | 1,91  | 465                                  | 1 330  | 700   |
| 1 980               | 4 300                   | 0,43                | 1,55  | 2,31  | 1,52  | 450                                  | 1 540  | 730   |
| 1 980               | 4 300                   | 0,43                | 1,55  | 2,31  | 1,52  | 450                                  | 1 540  | 730   |



# Tapered roller bearings

Matched pairs  
In X arrangement



Mounting dimensions

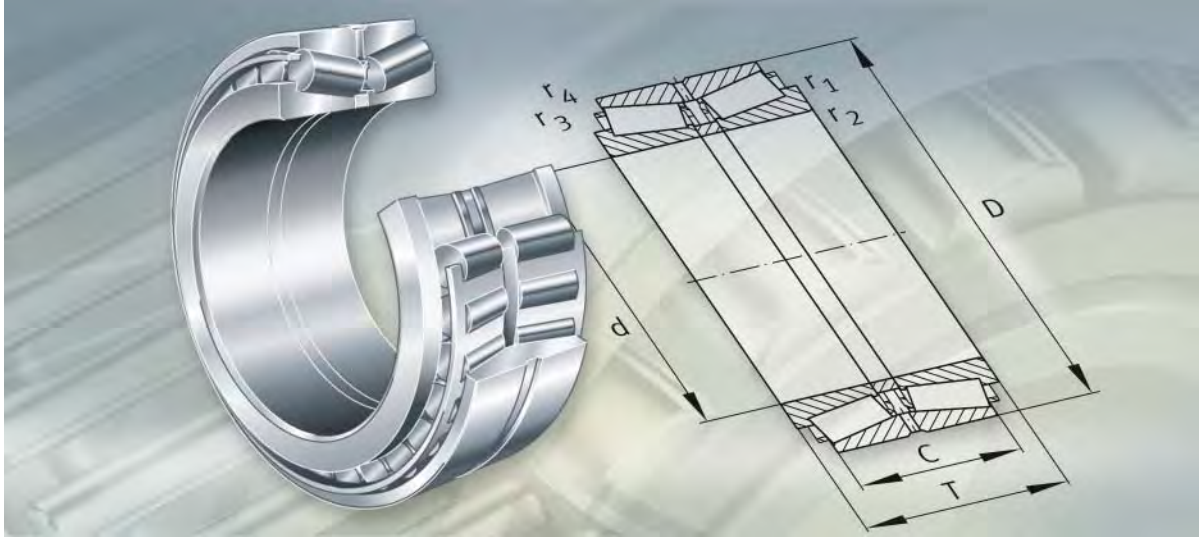
**Dimension table** (continued) · Dimensions in mm

| Designation                   | Mass for bearing pair<br>m<br>≈kg | Dimensions |     |     |     |   |    | Mounting dimensions    |                |      |                        |                        |
|-------------------------------|-----------------------------------|------------|-----|-----|-----|---|----|------------------------|----------------|------|------------------------|------------------------|
|                               |                                   | d          | D   | 2B  | 2T  | r <sub>3</sub> , r <sub>4</sub><br>min. | A  | d <sub>a</sub><br>max. | D <sub>a</sub> |      | C <sub>a</sub><br>min. | r <sub>b</sub><br>max. |
|                               |                                   |            |     |     |     |   |    |                        | min.           | max. |                        |                        |
| <b>32056-X-N11CA</b>          | 82                                | <b>280</b> | 420 | 174 | 174 | 4                                       | 44 | 305                    | 370            | 402  | 14                     | 4                      |
| <b>32056-X-N11CA-A550-600</b> | 82                                | <b>280</b> | 420 | 174 | 174 | 4                                       | 44 | 305                    | 370            | 402  | 14                     | 4                      |
| <b>32256-N11CA</b>            | 227                               | <b>280</b> | 500 | 260 | 274 | 5                                       | 62 | 322                    | 418            | 477  | 14                     | 5                      |
| <b>32960-N11CA</b>            | 63,6                              | <b>300</b> | 420 | 152 | 152 | 3                                       | 38 | 324                    | 383            | 406  | 12                     | 3                      |
| <b>32960-N11CA-A650-700</b>   | 63,6                              | <b>300</b> | 420 | 152 | 152 | 3                                       | 38 | 324                    | 383            | 406  | 12                     | 3                      |
| <b>32060-X-N11CA</b>          | 117                               | <b>300</b> | 460 | 200 | 200 | 4                                       | 52 | 329                    | 404            | 442  | 15                     | 4                      |
| <b>32060-X-N11CA-A450-500</b> | 117                               | <b>300</b> | 460 | 200 | 200 | 4                                       | 52 | 329                    | 404            | 442  | 15                     | 4                      |
| <b>32964-N11CA</b>            | 67,2                              | <b>320</b> | 440 | 152 | 152 | 3                                       | 38 | 343                    | 402            | 426  | 13                     | 3                      |
| <b>32964-N11CA-A600-650</b>   | 67,2                              | <b>320</b> | 440 | 152 | 152 | 3                                       | 38 | 343                    | 402            | 426  | 13                     | 3                      |
| <b>32064-X-N11CA</b>          | 125                               | <b>320</b> | 480 | 200 | 200 | 4                                       | 52 | 350                    | 424            | 462  | 15                     | 4                      |
| <b>32064-X-N11CA-A650-700</b> | 125                               | <b>320</b> | 480 | 200 | 200 | 4                                       | 52 | 350                    | 424            | 462  | 15                     | 4                      |
| <b>32968-N11CA</b>            | 73,1                              | <b>340</b> | 460 | 152 | 152 | 3                                       | 38 | 361                    | 421            | 446  | 12                     | 3                      |
| <b>32968-N11CA-A550-600</b>   | 73,1                              | <b>340</b> | 460 | 152 | 152 | 3                                       | 38 | 361                    | 421            | 446  | 12                     | 3                      |



| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>Bearing pair<br>$n_G$<br>min <sup>-1</sup> | Reference speed<br>Bearing pair<br>$n_B$<br>min <sup>-1</sup> |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 2 050               | 4 600                   | 0,46                | 1,47  | 2,19  | 1,44  | 475                                  | 1 400  | 670   |
| 2 050               | 4 600                   | 0,46                | 1,47  | 2,19  | 1,44  | 475                                  | 1 400  | 670   |
| 3 950               | 7 900                   | 0,45                | 1,5   | 2,24  | 1,47  | 790                                  | 1 190  | 520   |
| 1 760               | 4 300                   | 0,39                | 1,71  | 2,54  | 1,67  | 440                                  | 1 330  | 630   |
| 1 760               | 4 300                   | 0,39                | 1,71  | 2,54  | 1,67  | 440                                  | 1 330  | 630   |
| 2 600               | 5 700                   | 0,43                | 1,55  | 2,31  | 1,52  | 580                                  | 1 260  | 600   |
| 2 600               | 5 700                   | 0,43                | 1,55  | 2,31  | 1,52  | 580                                  | 1 260  | 600   |
| 1 810               | 4 550                   | 0,42                | 1,62  | 2,42  | 1,59  | 460                                  | 1 260  | 590   |
| 1 810               | 4 550                   | 0,42                | 1,62  | 2,42  | 1,59  | 460                                  | 1 260  | 590   |
| 2 700               | 6 100                   | 0,46                | 1,47  | 2,19  | 1,44  | 610                                  | 1 190  | 580   |
| 2 700               | 6 100                   | 0,46                | 1,47  | 2,19  | 1,44  | 610                                  | 1 190  | 580   |
| 1 850               | 4 750                   | 0,44                | 1,54  | 2,3   | 1,51  | 475                                  | 1 190  | 550   |
| 1 850               | 4 750                   | 0,44                | 1,54  | 2,3   | 1,51  | 475                                  | 1 190  | 550   |





**Double row tapered roller bearings**

# Double row tapered roller bearings

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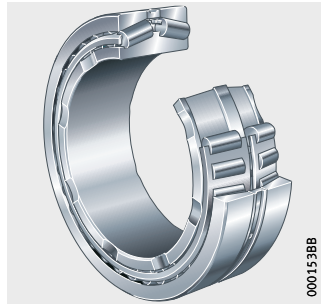


# Product overview Double row tapered roller bearings

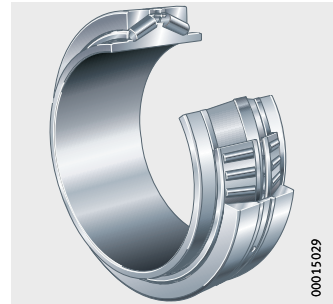
## With two outer rings (X arrangement)

For loose fit on the journal  
With extended inner ring

Z-5..TR2-06, F-8..TR2-06



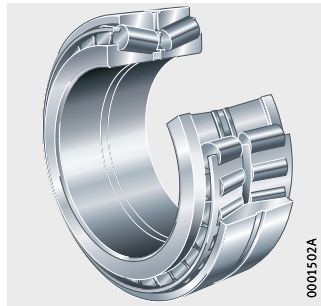
Z-5..TR2-03, F-8..TR2-03



## With two inner rings (O arrangement)

With intermediate ring  
Without intermediate ring

Z-5..TR2-05, F-8..TR2-05



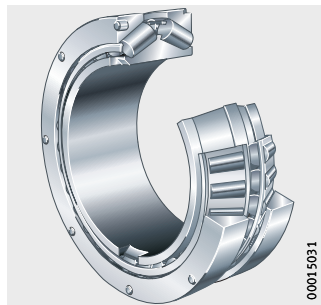
Z-5..TR2-04, F-8..TR2-04



## With large contact angle (X arrangement)

Axial bearings for work rolls  
Axial bearings for oil film bearings

Z-5..TR2-01, F-8..TR2-01



Z-5..TR2-02, F-8..TR2-02



# Double row tapered roller bearings

## Features

Double row tapered roller bearings of various designs are special bearings with the designation Z-5..TR2 or F-8..TR2. They comprise solid bearing rings and tapered roller and cage assemblies. The bearings are suitable for axial loads in both directions and high radial loads. Most of the bearings are separable and give a loose fit on the journal. The complete bearing is then mounted in the chock, after which the chock together with the bearing is slid onto the journal. The exception is bearings with an extended inner ring and tapered bore. These give a tight fit on the journal.

## Bearings with two outer rings (X arrangement) for a loose fit on the journal

In bearings with two outer rings and one inner ring, the rows of rollers are in an X arrangement. The outer intermediate ring with a lubrication groove and lubrication holes defines the axial internal clearance suitable for the specific application.

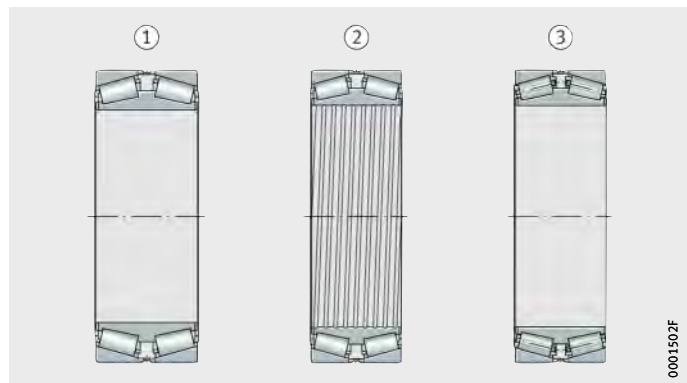
Application: for example in roll stands, *Figure 1*.

- Design 1
  - Bearings with cylindrical bore for loose fit on the journal.
  - Cages made from sheet steel
  - Main dimensions and tolerances in inches.
- Design 2
  - Bearings with cylindrical bore for loose fit on the journal.
  - Cages made from sheet steel
  - Main dimensions and tolerances in inches.
  - Helical groove in the inner ring for improved journal lubrication.
- Design 3
  - Bearings with cylindrical bore for loose fit on the journal.
  - Through-drilled rollers and pin cages for very high loads.
  - Main dimensions and tolerances in inches.

- ① Design 1
- ② Design 2
- ③ Design 3

*Figure 1*

Double row tapered roller bearings  
with two outer rings  
for loose fit on the journal



# Double row tapered roller bearings

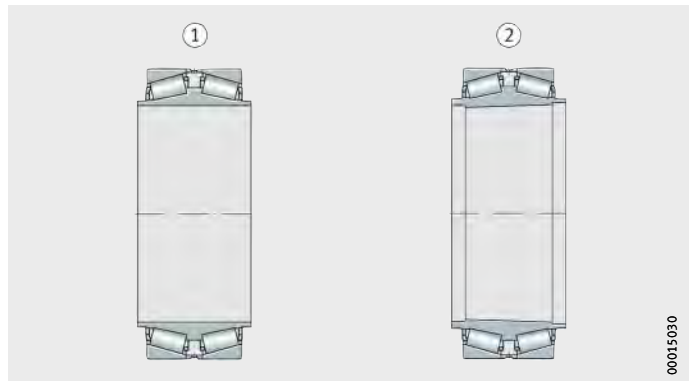
## Bearings with two outer rings (X arrangement) and extended inner ring

These double row tapered roller bearings also have two outer rings. The lateral extended sections of the inner ring are ground on the outside and serve as running surfaces for rotary shaft seals. Application: for example in roll stands, *Figure 2*.

- Design 4
  - Bearings with cylindrical bore for loose fit on the roll journal.
  - Cages made from sheet steel
  - Metric or inch sizes and tolerances.
- Design 5
  - Bearings with tapered bore (taper 1:12 or 1:30) for tight fit on the roll journal.
  - Cages made from sheet steel
  - Metric or inch sizes and tolerances.

- ① Design 4
- ② Design 5

*Figure 2*  
Double row tapered roller bearings  
with two outer rings and  
extended inner ring



## Bearings with two inner rings (O arrangement)

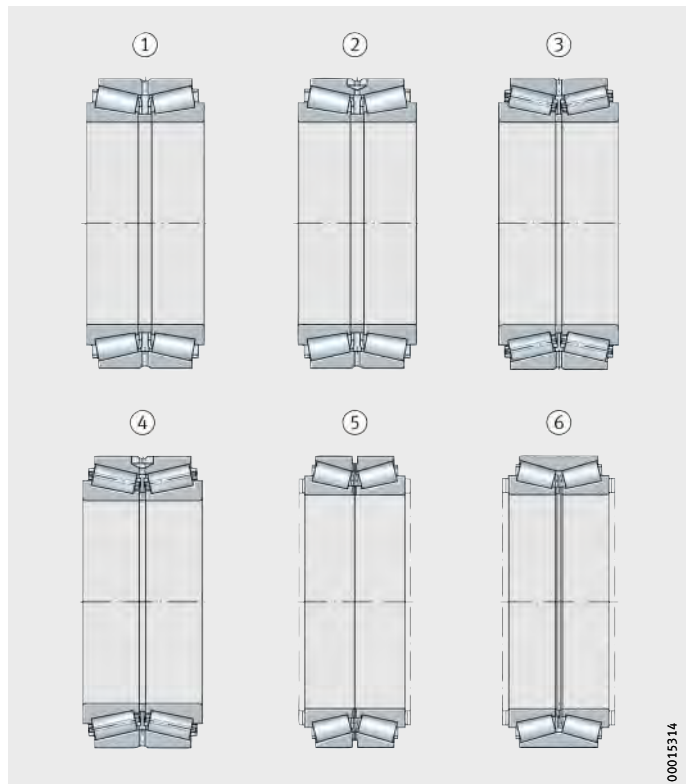
In tapered roller bearings with two inner rings and one outer ring, the two rows of rollers are in an O arrangement. As a result, these bearings are also suitable for tilting moments. If the bearings are used as non-locating bearings, the outer ring must have a loose fit. Normally, an inner intermediate ring defines the axial internal clearance suitable for the specific application. The main dimensions and tolerances are metric or in inches. Application: for example in roll stands, *Figure 3*, page 525.

- Design 6
  - Bearings with sheet steel cages and inner intermediate ring.
  - Lubrication groove and lubrication holes in the outer ring.
- Design 7
  - Bearings with sheet steel cages and inner intermediate ring.
  - Lubrication groove and lubrication holes as well as retaining hole in the outer ring.

- Design 8
  - Bearings with pin cages and inner intermediate ring.
  - Lubrication groove and lubrication holes in the outer ring.
  
- Design 9
  - Bearings with pin cages and inner intermediate ring.
  - Lubrication groove and lubrication holes as well as retaining hole in the outer ring.
  
- Design 10
  - Bearings without intermediate ring, with lubrication hole at the joint between the two inner rings.
  - Cages made from sheet steel
  - Application:
    - for example cable sheaves in drilling towers (additional lubrication groove and lubrication holes in the outer ring),
    - vertical roll stands (preloaded bearings with rings and rollers made from case hardening steel).
  
- Design 11
  - Bearings with lubrication groove and lubrication holes in the intermediate ring.
  - Cages made from sheet steel
  - Preloaded special bearings for vertical rolls in universal roll stands with rings and rollers made from case hardening steel.

- ① Design 6
- ② Design 7
- ③ Design 8
- ④ Design 9
- ⑤ Design 10
- ⑥ Design 11

*Figure 3*  
Double row tapered roller bearings  
with two inner rings



00015314

# Double row tapered roller bearings

## Bearings with large contact angle Axial bearings for work rolls

Tapered roller bearings with two outer rings and a large contact angle are suitable for particularly high axial loads. They are therefore used as axial bearings.

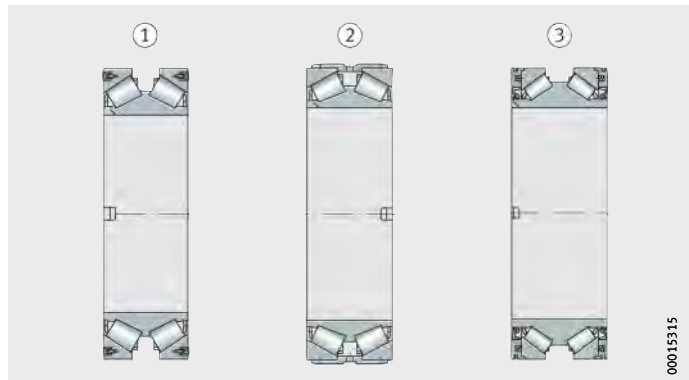
Designs 12 to 14 in metric or inch sizes are intended for work rolls, *Figure 4*.

Integrated springs or a retaining sleeve are used to give acceptable rolling behaviour.

- Design 12
  - Bearings with sheet steel cages.
  - Spring assemblies integrated in the outer rings.
  - Retaining slot on one side of the inner ring.
- Design 13
  - Bearings with sheet steel cages.
  - Self-retaining design with outer retaining sleeve.
  - Retaining slot on one side of the inner ring.
- Design 14
  - Bearings with sheet steel cages.
  - Seal carrier with springs and rotary shaft seal on both sides.
  - Retaining slot on one side of the inner ring.

- ① Design 12
- ② Design 13
- ③ Design 14

*Figure 4*  
Double row tapered roller bearings with large contact angle (axial bearings for work rolls)



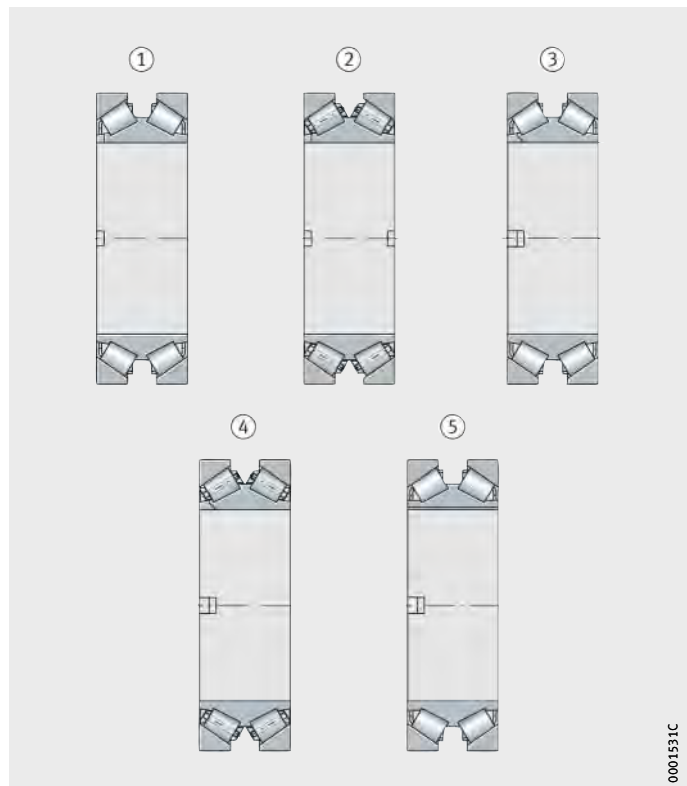


**Axial bearings for oil film bearings**

In axial bearings for oil film bearings (Designs 15 to 19), the outer rings are axially adjusted by means of external springs to give acceptable rolling behaviour. Since the bearings are seated on the roll journal with a loose fit, the inner ring has various retaining slots depending on the bearing design to act as anti-rotation devices.

Bearings are available in metric and inch sizes, *Figure 5*.

- Design 15 ■ Bearings with sheet steel cages  
■ Retaining slot on one side of the inner ring.
- Design 16 ■ Bearings with pin cages.  
■ Retaining slots on both sides of the inner ring.
- Design 17 ■ Bearings with sheet steel cages  
■ Retaining slot on one side of the inner ring.
- Design 18 ■ Bearings with pin cages.  
■ Retaining slot on one side of the inner ring.
- Design 19 ■ Bearings with sheet steel cages  
■ Axial retaining slot in the inner ring.



- ① Design 15
- ② Design 16
- ③ Design 17
- ④ Design 18
- ⑤ Design 19

*Figure 5*  
Double row tapered roller bearings  
with large contact angle  
(axial bearings for oil film bearings)

0001531C

## Double row tapered roller bearings

- Sealing** With the exception of Design 14 (axial bearings for work rolls), all the bearings described here are supplied without seals.
- Lubrication** These open double row tapered roller bearings can be lubricated with grease or oil. The sealed bearings are supplied filled with high quality rolling bearing grease.
- Operating temperature** Double row tapered roller bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ , depending on the lubricant. Sealed bearings are suitable for temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+110\text{ }^{\circ}\text{C}$ , restricted by the lubricant and seal material.
- Cages** Most double row tapered roller bearings have pressed cages made from sheet steel. Bearings with a pin cage and through-drilled rollers are specifically identified in the dimension tables. These bearings are designed for very high load carrying capacity and strong acceleration or deceleration.

**Design and safety guidelines**  
**Equivalent dynamic bearing load**

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

**Load ratio and equivalent dynamic load**

| Load ratio               | Equivalent dynamic bearing load      |
|--------------------------|--------------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r + Y_1 \cdot F_a$            |
| $\frac{F_a}{F_r} > e$    | $P = 0,67 \cdot F_r + Y_2 \cdot F_a$ |

- P kN  
Equivalent dynamic bearing load for combined load
- $F_a$  kN  
Axial dynamic bearing load
- $F_r$  kN  
Radial dynamic bearing load
- $e, Y_1, Y_2$  –  
Factors, see dimension tables.

**Bearings under axial load with large contact angle**

For bearings under purely axial load with a large contact angle, the following applies:

$$P = Y \cdot F_a$$

- Y –  
Factor, see dimension tables
- $F_a$  kN  
Axial dynamic bearing load.



# Double row tapered roller bearings

## Equivalent static bearing load

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$  kN  
Equivalent static bearing load for combined load  
 $F_{0r}$  kN  
Radial static bearing load  
 $Y_0$  –  
Factor, see dimension tables  
 $F_{0a}$  kN  
Axial static bearing load.

## Bearings under axial load with large contact angle

For bearings under purely axial load with a large contact angle, the following applies:

$$P_0 = Y_0 \cdot F_{0a}$$

$P_0$  kN  
Equivalent static bearing load for combined load  
 $Y_0$  –  
Factor, see dimension tables  
 $F_{0a}$  kN  
Axial static bearing load.

## Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of  $C_r/P > 0,02$  is therefore necessary.

## Comparative load ratings

The basic dynamic load ratings  $C_r$  to DIN ISO 281 are based on a basic rating life of 1 million revolutions. Competitors sometimes give different load ratings that are based on 90 million revolutions (3 000 h at  $500 \text{ min}^{-1}$ ). Since it is not possible to compare these values with the basic load ratings calculated according to ISO, please contact us regarding the comparative load ratings  $C_{r90}$  and  $C_{a90}$ .

## Design of bearing arrangements

### Shaft tolerances

| Double row tapered roller bearings   | Nominal dimension | Tolerance <sup>1)</sup> |
|--------------------------------------|-------------------|-------------------------|
|                                      | d<br>mm           | mm                      |
| Metric tolerances,<br>with loose fit | < 315             | -0,180...-0,230         |
|                                      | 315 ...630        | -0,240...-0,300         |
|                                      | > 630 ...800      | -0,325...-0,410         |
|                                      | > 800             | -0,350...-0,450         |
| Inch tolerances,<br>with loose fit   | > 152,4...203,2   | -0,150...-0,175         |
|                                      | > 203,2...304,8   | -0,180...-0,205         |
|                                      | > 304,8...609,6   | -0,200...-0,249         |
|                                      | > 609,6...914,4   | -0,250...-0,334         |
|                                      | > 914,4           | -0,300...-0,400         |
| Axial bearings                       | d                 | e7                      |

<sup>1)</sup> In the case of high speeds and bearings with a tapered bore, please contact us to discuss the tolerances for the adjacent parts.

### Housing tolerances

| Double row tapered roller bearings | Nominal dimension | Tolerance <sup>1)</sup> |
|------------------------------------|-------------------|-------------------------|
|                                    | D<br>mm           | mm                      |
| Metric tolerances                  | ≤ 800             | H6                      |
|                                    | > 800             | H7                      |
| Inch tolerances                    | > 304,8... 609,6  | +0,101...+0,150         |
|                                    | > 609,6... 914,4  | +0,156...+0,230         |
|                                    | > 914,4... 1219,2 | +0,202...+0,300         |
|                                    | > 1219,6          | +0,257...+0,380         |
| Axial bearings                     | ≤ 500             | +0,6 ...+0,8            |
|                                    | > 500 ... 800     | +0,8 ...+1,1            |
|                                    | > 800             | +1,2 ...+1,5            |

<sup>1)</sup> In the case of high axial forces and bearings with a tapered bore, please contact us to discuss the tolerances for the adjacent parts.



# Double row tapered roller bearings

## Accuracy

The dimensional and running tolerances of double row tapered roller bearings are generally defined for individual cases.

Please contact us regarding the values.

Normal tolerances for bearings in metric and inch sizes should be taken from the following tables.

### Normal tolerances for bearings in metric sizes

| Nominal dimension |       | Bore deviation            |      | Outside diameter deviation |      | Width deviation                        |       |
|-------------------|-------|---------------------------|------|----------------------------|------|--|-------|
| mm                |       | $\Delta_{dmp}$<br>$\mu m$ |      | $\Delta_{Dmp}$<br>$\mu m$  |      | $\Delta_{Bs} = \Delta_{Cs}$<br>$\mu m$ |       |
| over              | incl. | max.                      | min. | max.                       | min. | max.                                   | min.  |
| 180               | 250   | 0                         | -30  | 0                          | -30  | 0                                      | -300  |
| 250               | 315   | 0                         | -35  | 0                          | -35  | 0                                      | -350  |
| 315               | 400   | 0                         | -40  | 0                          | -40  | 0                                      | -400  |
| 400               | 500   | 0                         | -45  | 0                          | -45  | 0                                      | -450  |
| 500               | 630   | 0                         | -50  | 0                          | -50  | 0                                      | -500  |
| 630               | 800   | 0                         | -75  | 0                          | -75  | 0                                      | -750  |
| 800               | 1000  | 0                         | -100 | 0                          | -100 | 0                                      | -1000 |
| 1000              | 1250  | 0                         | -125 | 0                          | -125 | 0                                      | -1250 |
| 1250              | 1600  | 0                         | -160 | 0                          | -160 | 0                                      | -1600 |
| 1600              | 2000  | 0                         | -200 | 0                          | -200 | 0                                      | -2000 |

### Normal tolerances for bearings in inch sizes

| Nominal dimension |        | Bore deviation            |      | Outside diameter deviation |      | Width deviation                        |      |
|-------------------|--------|---------------------------|------|----------------------------|------|--|------|
| mm                |        | $\Delta_{dmp}$<br>$\mu m$ |      | $\Delta_{Dmp}$<br>$\mu m$  |      | $\Delta_{Bs} = \Delta_{Cs}$<br>$\mu m$ |      |
| over              | incl.  | max.                      | min. | max.                       | min. | max.                                   | min. |
| 304,8             | 609,6  | +51                       | 0    | +51                        | 0    | $\pm 762$                              | 0    |
| 609,6             | 914,4  | +76                       | 0    | +76                        | 0    | $\pm 762$                              | 0    |
| 914,4             | 1219,2 | +102                      | 0    | +102                       | 0    | $\pm 762$                              | 0    |
| 1219,2            | -      | +127                      | 0    | +127                       | 0    | $\pm 762$                              | 0    |

## Axial internal clearance

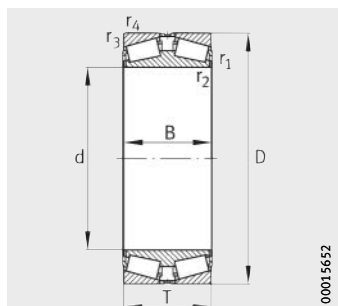
The axial internal clearance of double row tapered roller bearings differs according to the bearing size and application.

Please contact us for values.

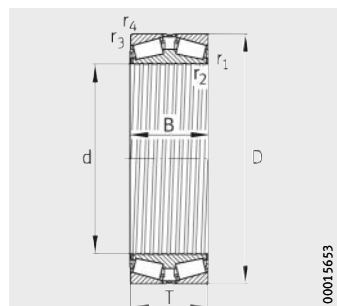


# Tapered roller bearings

Double row,  
X arrangement  
For loose fit  
on the roll journal



Design 1



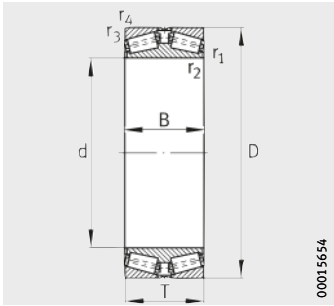
Design 2

Dimension table - Dimensions in mm

| Designation     | Design | Mass<br>m<br>≈kg | Dimensions      |         |         |         |   |   |
|-----------------|--------|------------------|-----------------|---------|---------|---------|---|---|
|                 |        |                  | d               | D       | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-541397.TR2    | 1      | 77,1             | <b>203,2</b>    | 368,3   | 158,75  | 152,4   | 3,3                                     | 3,3                                     |
| F-800579.TR2    | 1      | 24,7             | <b>234,95</b>   | 327,025 | 93,662  | 93,662  | 3,3                                     | 3,3                                     |
| Z-564290.TR2    | 1      | 67,8             | <b>2 44,475</b> | 381     | 146,05  | 146,05  | 3,3                                     | 4,8                                     |
| Z-511577.TR2    | 1      | 41,6             | <b>254</b>      | 358,775 | 130,175 | 130,175 | 1,5                                     | 3,3                                     |
| Z-547757.TR2    | 1      | 104              | <b>254</b>      | 438,15  | 165,1   | 165,1   | 3,3                                     | 6,4                                     |
| Z-505684.TR2    | 1      | 89,7             | <b>254</b>      | 444,5   | 133,35  | 133,35  | 3,3                                     | 6,4                                     |
| Z-517563.01.TR2 | 1      | 50,2             | <b>269,875</b>  | 381     | 136,525 | 136,525 | 3,3                                     | 3,3                                     |
| Z-564144.TR2    | 1      | 129              | <b>279,4</b>    | 469,9   | 169,863 | 166,688 | 3,3                                     | 6,4                                     |
| Z-546348.TR2    | 1      | 59,5             | <b>288,925</b>  | 406,4   | 144,462 | 144,462 | 3,3                                     | 3,3                                     |
| Z-542664.TR2    | 1      | 67,8             | <b>300,038</b>  | 422,275 | 150,813 | 150,812 | 3,3                                     | 3,3                                     |
| Z-572151.TR2    | 1      | 55,2             | <b>304,8</b>    | 419,1   | 130,175 | 130,175 | 1,5                                     | 6,4                                     |
| Z-575744.TR2    | 1      | 68               | <b>305</b>      | 438,048 | 133,35  | 134,938 | 3,3                                     | 4,8                                     |
| Z-510687.01.TR2 | 1      | 92               | <b>333,375</b>  | 469,9   | 166,688 | 166,688 | 3,3                                     | 3,3                                     |
| Z-515956.TR2    | 1      | 112              | <b>342,9</b>    | 533,4   | 139,69  | 146,05  | 3,3                                     | 3,3                                     |
| Z-575296.TR2    | 2      | 106              | <b>346,075</b>  | 488,95  | 174,625 | 174,625 | 3,3                                     | 3,3                                     |
| Z-518240.01.TR2 | 2      | 150              | <b>384,175</b>  | 546,1   | 193,675 | 193,675 | 3,3                                     | 6,4                                     |
| Z-533805.TR2    | 3      | 150              | <b>384,175</b>  | 546,1   | 193,675 | 193,675 | 3,3                                     | 6,4                                     |
| F-804701.TR2    | 2      | 89               | <b>406,4</b>    | 546,1   | 138,112 | 138,112 | 1,5                                     | 6,4                                     |
| Z-531821.TR2    | 1      | 145              | <b>406,4</b>    | 565,15  | 184,15  | 184,15  | 3,3                                     | 6,4                                     |
| Z-525090.TR2    | 1      | 115              | <b>409,575</b>  | 546,1   | 161,925 | 161,925 | 1,5                                     | 6,4                                     |
| Z-524903.TR2    | 1      | 184              | <b>415,925</b>  | 590,55  | 209,55  | 209,55  | 3,3                                     | 6,4                                     |
| Z-528949.TR2    | 1      | 474              | <b>431,902</b>  | 685,698 | 330,2   | 330,2   | 6,4                                     | 6,4                                     |
| Z-518667.TR2    | 1      | 222              | <b>447,675</b>  | 635     | 223,838 | 223,838 | 3,3                                     | 6,4                                     |
| Z-515087.01.TR2 | 1      | 281              | <b>479,425</b>  | 679,45  | 238,125 | 238,125 | 3,3                                     | 6,4                                     |
| Z-503772.TR2    | 2      | 320              | <b>501,65</b>   | 711,2   | 250,825 | 250,825 | 3,3                                     | 6,4                                     |
| Z-536245.TR2    | 1      | 351              | <b>508</b>      | 762     | 219,075 | 219,075 | 6,4                                     | 6,4                                     |
| Z-532273.TR2    | 3      | 610              | <b>520</b>      | 820     | 300     | 300     | 4                                       | 6                                       |
| Z-526165.TR2    | 2      | 392              | <b>536,575</b>  | 761,873 | 269,875 | 269,875 | 3,3                                     | 6,4                                     |
| Z-544145.TR2    | 1      | 228              | <b>558,8</b>    | 736,6   | 196,85  | 196,85  | 3,3                                     | 6,4                                     |
| Z-543718.TR2    | 3      | 505              | <b>571,5</b>    | 812,8   | 285,75  | 285,75  | 3,3                                     | 6,4                                     |

1) The comparative designations were taken from documents available to us. They give information on identical main dimensions and chamfer dimensions only. The cage and bearing designs are not always identical. Furthermore, the table makes no claims to completeness.





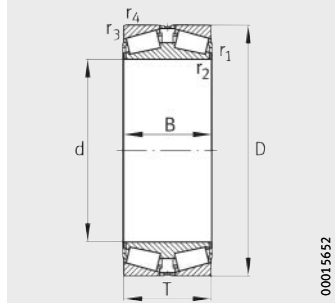
Design 3  
With pin cage

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load | Interchange designation <sup>1)</sup> |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|---------------------------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     | TDI types                             |
| 1 690               | 3 450                   | 0,39                | 1,71  | 2,54  | 1,67  | 375                | EE420800DW.450                        |
| 830                 | 1 960                   | 0,41                | 1,66  | 2,47  | 1,62  | –                  | 85 76D W.8 520                        |
| 1 600               | 3 500                   | 0,46                | 1,46  | 2,17  | 1,43  | 370                | EE126096DW.150                        |
| 1 360               | 3 150                   | 0,34                | 1,98  | 2,95  | 1,94  | 335                | M249749DW.710                         |
| 2 170               | 4 100                   | 0,36                | 1,87  | 2,78  | 1,83  | 415                | EE738101DW.712                        |
| 1 710               | 3 050                   | 0,36                | 1,85  | 2,76  | 1,81  | 305                | EE822101DW.175                        |
| 1 550               | 3 700                   | 0,33                | 2,03  | 3,02  | 1,99  | 390                | M252349DW.310                         |
| 2 400               | 5 100                   | 0,37                | 1,8   | 2,69  | 1,76  | –                  | EE722111DW.185                        |
| 1 730               | 4 100                   | 0,35                | 1,94  | 2,89  | 1,9   | 430                | M255449DW.410                         |
| 1 790               | 4 350                   | 0,36                | 1,86  | 2,77  | 1,82  | 450                | HM256849DW.810                        |
| 1 560               | 3 800                   | 0,32                | 2,12  | 3,15  | 2,07  | –                  | M257149DW.110                         |
| 1 340               | 3 200                   | 0,4                 | 1,69  | 2,52  | 1,65  | –                  | EE129123DW.172                        |
| 2 120               | 5 400                   | 0,38                | 1,79  | 2,67  | 1,75  | 540                | HM261049DW.010                        |
| 2 120               | 3 900                   | 0,33                | 2,03  | 3,02  | 1,98  | –                  | EE971355DW.100                        |
| 2 480               | 6 300                   | 0,33                | 2,03  | 3,02  | 1,98  | 620                | HM262749DW.710                        |
| 3 050               | 7 900                   | 0,33                | 2,03  | 3,02  | 1,98  | 750                | HM266449DW.410                        |
| 3 050               | 7 900                   | 0,33                | 2,03  | 3,02  | 1,98  | 750                | HM266449D.410                         |
| 1 910               | 4 650                   | 0,43                | 1,56  | 2,33  | 1,53  | 435                | LM767749DW.710                        |
| 3 000               | 7 500                   | 0,43                | 1,57  | 2,34  | 1,53  | –                  | M267949DW.910                         |
| 2 240               | 6 200                   | 0,45                | 1,5   | 2,24  | 1,47  | –                  | M667947DW.911                         |
| 3 400               | 8 300                   | 0,34                | 1,98  | 2,94  | 1,93  | 770                | M268749DW.710                         |
| 6 700               | 15 000                  | 0,32                | 2,12  | 3,15  | 2,07  | –                  | EE650171D.270                         |
| 4 900               | 10 400                  | 0,33                | 2,07  | 3,09  | 2,03  | 940                | M270749DW.710                         |
| 4 700               | 12 200                  | 0,33                | 2,03  | 3,02  | 1,98  | 1 090              | M272749DW.710                         |
| 4 900               | 12 800                  | 0,35                | 1,92  | 2,86  | 1,88  | 1 130              | M274149DW.110                         |
| 4 500               | 10 200                  | 0,39                | 1,73  | 2,58  | 1,69  | 870                | EE531201DW.300                        |
| 7 600               | 17 300                  | 0,4                 | 1,68  | 2,5   | 1,64  | 1 440              | –                                     |
| 5 900               | 15 000                  | 0,3                 | 2,28  | 3,39  | 2,23  | 1 290              | M276449DW.410                         |
| 3 900               | 10 800                  | 0,35                | 1,95  | 2,9   | 1,91  | –                  | LM377449.410                          |
| 6 900               | 18 100                  | 0,33                | 2,03  | 3,02  | 1,98  | 1 530              | M278749DW.710                         |

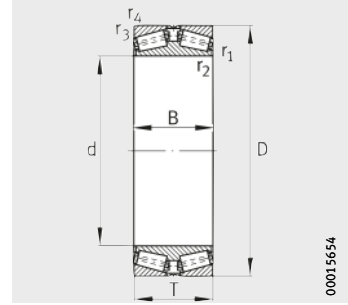


# Tapered roller bearings

Double row,  
X arrangement  
For loose fit  
on the roll journal



Design 1



Design 3  
With pin cage

**Dimension table** (continued) · Dimensions in mm

| Designation            | Design          | Mass<br>m<br>≈ kg | Dimensions     |         |         |         |   |   |
|------------------------|-----------------|-------------------|----------------|---------|---------|---------|---|---|
|                        |                 |                   | d              | D       | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| <b>Z-538086.TR2</b>    | 1               | 267               | <b>609,6</b>   | 820     | 171,45  | 171,45  | 3,3                                     | 6,4                                     |
| <b>F-804575.TR2</b>    | 1               | 709               | <b>635</b>     | 939,8   | 304,8   | 304,8   | 3,3                                     | 6,4                                     |
| <b>F-800501.TR2</b>    | 3               | 746               | <b>635</b>     | 939,8   | 304,8   | 304,8   | 3,3                                     | 6,4                                     |
| <b>Z-515897.01.TR2</b> | 3               | 735               | <b>657,225</b> | 933,45  | 328,613 | 328,613 | 3,3                                     | 6,4                                     |
| <b>Z-568023.TR2</b>    | 3               | 828               | <b>682,625</b> | 965,2   | 338,138 | 338,138 | 3,3                                     | 6,4                                     |
| <b>Z-532828.TR2</b>    | 3 <sup>1)</sup> | 320               | <b>710</b>     | 900     | 197     | 197     | 3,3                                     | 6,4                                     |
| <b>Z-518933.TR2</b>    | 1               | 253               | <b>711,2</b>   | 914,4   | 149,225 | 149,225 | 3,3                                     | 6,4                                     |
| <b>Z-524770.TR2</b>    | 3               | 1 440             | <b>825,5</b>   | 1 168,4 | 409,575 | 409,575 | 4,8                                     | 12,7                                    |
| <b>Z-539945.TR2</b>    | 3 <sup>2)</sup> | 2 000             | <b>901,7</b>   | 1 295,4 | 450,85  | 438,15  | 4,8                                     | 12,7                                    |
| <b>Z-521872.TR2</b>    | 3               | 2 030             | <b>939,8</b>   | 1 333,5 | 463,55  | 463,55  | 4,8                                     | 12,7                                    |

1) Bearing with helical grooves in the inner ring bore.

2) Bearing with lubrication holes through the central rib of the inner ring.

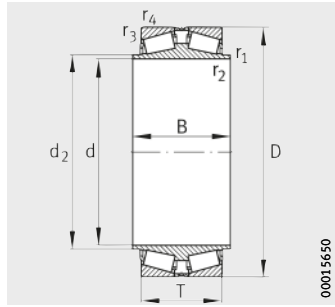
3) The comparative designations were taken from documents available to us. They give information on identical main dimensions and chamfer dimensions only. The cage and bearing designs are not always identical. Furthermore, the table makes no claims to completeness.

| Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    | Interchange designation <sup>3)</sup> |
|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|---------------------------------------|
| dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN | TDI types                             |
| 3 300                        | 9 300                          | 0,48                | 1,39           | 2,07           | 1,36           | 770                   | –                                     |
| 6 400                        | 15 300                         | 0,56                | 1,2            | 1,79           | 1,18           | –                     | –                                     |
| 6 800                        | 16 800                         | 0,56                | 1,2            | 1,79           | 1,18           | 1 350                 | –                                     |
| 8 900                        | 23 700                         | 0,33                | 2,03           | 3,02           | 1,98           | 1 920                 | M281649D.610                          |
| 9 000                        | 25 500                         | 0,33                | 2,03           | 3,02           | 1,98           | 2 050                 | M282249DW.210                         |
| 4 550                        | 13 500                         | 0,35                | 1,95           | 2,9            | 1,91           | 1 090                 | SKF 331581A                           |
| 3 400                        | 9 500                          | 0,38                | 1,77           | 2,63           | 1,73           | 750                   | EE755281D.360                         |
| 12 800                       | 36 500                         | 0,34                | 2              | 2,98           | 1,96           | 2 750                 | M285848D.810                          |
| 16 000                       | 43 000                         | 0,32                | 2,12           | 3,15           | 2,07           | 3 150                 | EE634356D.510                         |
| 16 000                       | 45 000                         | 0,33                | 2,03           | 3,02           | 1,98           | –                     | LM287849DW.810                        |

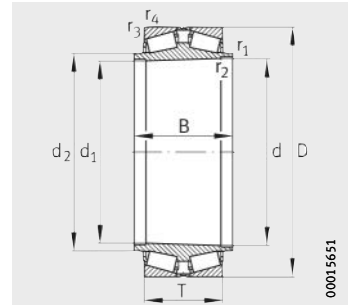


# Tapered roller bearings

Double row,  
X arrangement  
With two outer rings and  
extended inner ring



Design 4  
Cylindrical bore



Design 5  
Tapered bore taper 1:12

**Dimension table** - Dimensions in mm

| Designation  | Design          | Mass<br>m<br>≈kg | Dimensions     |                |         |         |         |   |
|--------------|-----------------|------------------|----------------|----------------|---------|---------|---------|---|
|              |                 |                  | d              | d <sub>1</sub> | D       | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. |
| Z-535082.TR2 | 5               | 70               | <b>208,89</b>  | 188,517        | 336,55  | 180,975 | 244,475 | 1,5                                     |
| Z-539084.TR2 | 5               | 58               | <b>219,605</b> | 206,243        | 336,55  | 160,34  | 223,83  | 1,5                                     |
| Z-548244.TR2 | 4               | 51,3             | <b>220</b>     | –              | 340     | 140     | 200     | 1,5                                     |
| Z-564232.TR2 | 5 <sup>1)</sup> | 55               | <b>220</b>     | 215,333        | 340     | 140     | 200     | 1,5                                     |
| Z-542129.TR2 | 5               | 70,4             | <b>220,13</b>  | 205,049        | 336,55  | 180,975 | 244,475 | 1,5                                     |
| Z-539574.TR2 | 5               | 77               | <b>230</b>     | 216,658        | 370     | 160     | 223,5   | 3                                       |
| Z-535081.TR2 | 4               | 52,5             | <b>269,875</b> | –              | 381     | 136,525 | 196,85  | 3,3                                     |
| Z-542146.TR2 | 5               | 56               | <b>272,39</b>  | 255,985        | 381     | 136,525 | 196,85  | 1,5                                     |
| Z-544753.TR2 | 5               | 170              | <b>280</b>     | 261,666        | 460     | 220     | 280     | 1                                       |
| Z-548243.TR2 | 4               | 74               | <b>288,925</b> | –              | 406,4   | 165,1   | 234,95  | 1,5                                     |
| Z-564231.TR2 | 5 <sup>1)</sup> | 76               | <b>288,925</b> | 283,422        | 406,4   | 165,1   | 234,95  | 1,5                                     |
| Z-539576.TR2 | 5               | 92               | <b>317,5</b>   | 304,271        | 447,675 | 159,512 | 222,25  | 3,3                                     |
| F-803981.TR2 | 4 <sup>2)</sup> | 117              | <b>325</b>     | –              | 469,9   | 182,563 | 247,65  | 1,5                                     |
| Z-548242.TR2 | 4               | 100              | <b>333,375</b> | –              | 469,9   | 166,688 | 231,775 | 1,5                                     |
| Z-564230.TR2 | 5 <sup>1)</sup> | 102              | <b>333,375</b> | 327,819        | 469,9   | 166,688 | 231,775 | 1,5                                     |
| Z-541965.TR2 | 5               | 115              | <b>333,375</b> | 318,161        | 469,9   | 182,563 | 247,65  | 1,5                                     |
| Z-544754.TR2 | 5               | 228              | <b>340</b>     | 321,666        | 520     | 220     | 280     | 1                                       |

1) With tapered bore, taper 1:30.

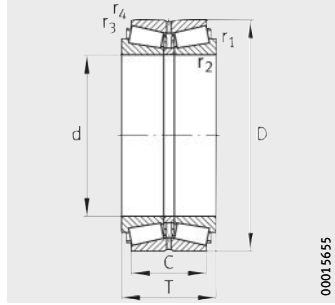
2) With helical grooves in the inner ring bore.

| r <sub>3</sub> , r <sub>4</sub><br>min. | d <sub>2</sub> | Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    |
|---|----------------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|
|   |                | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN |
| 3,3                                     | 228,6          | 1 920                        | 4 000                          | 0,34                | 2              | 2,98           | 1,96           | 445                   |
| 3                                       | 241,3          | 1 680                        | 3 600                          | 0,35                | 1,95           | 2,9            | 1,91           | 395                   |
| 4                                       | 244,5          | 1 530                        | 3 250                          | 0,43                | 1,57           | 2,34           | 1,53           | 355                   |
| 4                                       | 241,3          | 1 530                        | 3 250                          | 0,43                | 1,57           | 2,34           | 1,53           | 355                   |
| 3,3                                     | 242            | 1 860                        | 4 200                          | 0,35                | 1,95           | 2,9            | 1,91           | 465                   |
| 3                                       | 260,35         | 1 820                        | 3 700                          | 0,39                | 1,71           | 2,55           | 1,67           | 395                   |
| 3,3                                     | 292,1          | 1 550                        | 3 700                          | 0,33                | 2,03           | 3,02           | 1,99           | 390                   |
| 3,3                                     | 292,1          | 1 550                        | 3 700                          | 0,33                | 2,03           | 3,02           | 1,99           | 390                   |
| 6                                       | 311,15         | 3 150                        | 6 300                          | 0,35                | 1,93           | 2,87           | 1,88           | 640                   |
| 3,3                                     | 307,975        | 2 000                        | 4 750                          | 0,33                | 2,06           | 3,07           | 2,02           | 495                   |
| 3,3                                     | 307,975        | 2 000                        | 4 750                          | 0,33                | 2,06           | 3,07           | 2,02           | 495                   |
| 3,3                                     | 342,9          | 2 070                        | 5 200                          | 0,33                | 2,03           | 3,02           | 1,98           | 520                   |
| 3,3                                     | 355,6          | 2 550                        | 6 400                          | 0,32                | 2,12           | 3,15           | 2,07           | –                     |
| 3,3                                     | 355,6          | 2 120                        | 5 400                          | 0,38                | 1,79           | 2,67           | 1,75           | 540                   |
| 3,3                                     | 355,6          | 2 120                        | 5 400                          | 0,38                | 1,79           | 2,67           | 1,75           | 540                   |
| 3,3                                     | 361,9          | 2 550                        | 6 400                          | 0,32                | 2,12           | 3,15           | 2,07           | –                     |
| 6                                       | 371,475        | 3 350                        | 7 200                          | 0,4                 | 1,67           | 2,49           | 1,63           | –                     |

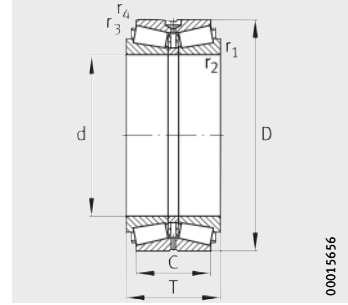


# Tapered roller bearings

Double row,  
O arrangement



Design 6



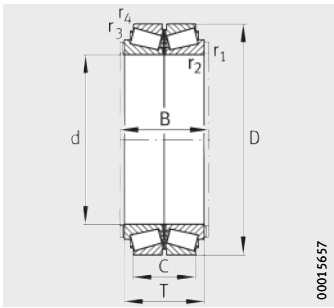
Design 7

Dimension table - Dimensions in mm

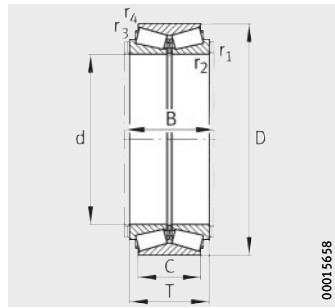
| Designation     | Design             | Mass<br>m<br>≈kg | Dimensions |        |         |     |         |   |   |
|-----------------|--------------------|------------------|------------|--------|---------|-----|---------|---|---|
|                 |                    |                  | d          | D      | T       | B   | C       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-543034.TR2    | 10                 | 77               | 165,1      | 336,55 | 194,15  | –   | 149,7   | 3,3                                     | 3,3                                     |
| Z-577350.TR2    | 6                  | 49,6             | 190        | 320    | 172     | –   | 134     | 4                                       | 1,5                                     |
| Z-511982.TR2    | 6                  | 61,1             | 200        | 340    | 184     | –   | 150     | 4                                       | 1,5                                     |
| F-800116.TR2    | 10                 | 63,6             | 200        | 360    | 218     | –   | 174     | 5                                       | 1,5                                     |
| Z-577083.TR2    | 10                 | 110              | 203,2      | 393,7  | 212     | –   | 171,45  | 3                                       | 1,5                                     |
| Z-567227.TR2    | 11                 | 72               | 206,375    | 336,55 | 211,138 | –   | 169,863 | 3,3                                     | 1,5                                     |
| Z-566204.TR2    | 10                 | 48,6             | 220        | 340    | 154     | –   | 120     | 4                                       | 1,5                                     |
| Z-511984.TR2    | 7                  | 51,7             | 220        | 340    | 165     | –   | 130     | 4                                       | 1,5                                     |
| Z-548864.TR2    | 10                 | 60               | 220        | 340    | 196     | –   | 160     | 3                                       | 1,5                                     |
| Z-580871.TR2    | 6                  | 79,7             | 220        | 370    | 200     | –   | 166     | 5                                       | 1,5                                     |
| Z-573103.TR2    | 10                 | 93,2             | 220        | 370    | 225     | –   | 184     | 3                                       | 1,5                                     |
| Z-541910.TR2    | 7                  | 48,7             | 230        | 355    | 145     | –   | 110     | 6                                       | 2,5                                     |
| Z-568648.TR2    | 6                  | 22,3             | 240        | 320    | 110     | –   | 87      | 3                                       | 1                                       |
| Z-511985.TR2    | 7                  | 58,5             | 240        | 360    | 165     | –   | 130     | 3                                       | 1                                       |
| Z-511983.TR2    | 6                  | 100              | 240        | 400    | 210     | –   | 168     | 5                                       | 1,5                                     |
| Z-566443.01.TR2 | 11 <sup>1)2)</sup> | 174              | 240        | 440    | 268     | 278 | 200     | 5                                       | 4                                       |
| F-803101.TR2    | 11                 | 101              | 242        | 406    | 206     | –   | 160     | 6                                       | 1,5                                     |
| Z-543185.01.TR2 | 11 <sup>1)2)</sup> | 102              | 242        | 406    | 206     | 216 | 150     | 6                                       | 5                                       |
| Z-543325.01.TR2 | 11 <sup>1)</sup>   | 102              | 242        | 406    | 206     | 216 | 160     | 6                                       | 1,5                                     |
| Z-564234.TR2    | 10 <sup>1)</sup>   | 102              | 242        | 406    | 206     | 216 | 162     | 5                                       | 1,5                                     |
| Z-576107.TR2    | 10                 | 158              | 255        | 440    | 265     | –   | 214     | 3                                       | 1,5                                     |
| Z-511987.TR2    | 6                  | 37,8             | 260        | 360    | 134     | –   | 108     | 3                                       | 1                                       |
| Z-514164.TR2    | 6                  | 60,9             | 260        | 400    | 150     | –   | 110     | 6                                       | 2,5                                     |
| Z-511988.TR2    | 7                  | 81               | 260        | 400    | 186     | –   | 146     | 5                                       | 3                                       |
| Z-579708.TR2    | 10 <sup>1)</sup>   | 84               | 260        | 400    | 194     | 204 | 150     | 3                                       | 1,5                                     |
| Z-577881.TR2    | 10                 | 84               | 260        | 400    | 196     | –   | 160     | 3                                       | 1,5                                     |
| Z-539099.TR2    | 7                  | 93,5             | 260        | 430    | 180     | –   | 130     | 10                                      | 2,5                                     |
| Z-511989.TR2    | 6                  | 129              | 260        | 440    | 225     | –   | 180     | 4                                       | 1                                       |
| Z-564747.TR2    | 11 <sup>1)2)</sup> | 220              | 260        | 480    | 282     | 292 | 212     | 6                                       | 5                                       |
| Z-564746.TR2    | 10 <sup>1)</sup>   | 218              | 260        | 480    | 282     | 292 | 440     | 6                                       | 1,5                                     |
| Z-565251.TR2    | 11 <sup>1)</sup>   | 219              | 260        | 480    | 284     | 294 | 220     | 6                                       | 1,5                                     |
| Z-573594.TR2    | 11 <sup>1)</sup>   | 220              | 260        | 480,5  | 284     | 294 | 220     | 6                                       | 1,5                                     |
| Z-538180.TR2    | 6                  | 85,2             | 280        | 420    | 189     | –   | 154     | 5                                       | 2                                       |
| F-800117.TR2    | 10                 | 231              | 280        | 500    | 284     | –   | 222     | 6                                       | 2                                       |

1) Spacer ring on both sides.

2) Two outer rings with intermediate ring.



Design 10



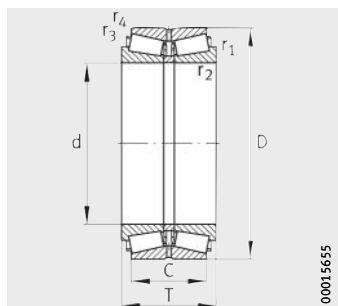
Design 11

| Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    |
|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|
| dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN |
| 1930                         | 3 100                          | 0,32                | 2,12           | 3,15           | 2,07           | –                     |
| 1480                         | 2 800                          | 0,36                | 1,9            | 2,83           | 1,86           | 315                   |
| 1710                         | 3 150                          | 0,26                | 2,55           | 3,8            | 2,5            | 350                   |
| 2 240                        | 4 150                          | 0,41                | 1,66           | 2,47           | 1,62           | –                     |
| 2 270                        | 3 950                          | 0,35                | 1,95           | 2,9            | 1,91           | 415                   |
| 1920                         | 4 000                          | 0,34                | 2              | 2,98           | 1,96           | 445                   |
| 1460                         | 3 100                          | 0,43                | 1,57           | 2,34           | 1,53           | –                     |
| 1 530                        | 3 250                          | 0,43                | 1,57           | 2,34           | 1,53           | 355                   |
| 1 800                        | 3 900                          | 0,35                | 1,95           | 2,9            | 1,91           | –                     |
| 1 930                        | 3 750                          | 0,24                | 2,84           | 4,22           | 2,77           | 405                   |
| 2 440                        | 4 900                          | 0,35                | 1,95           | 2,9            | 1,91           | 530                   |
| 1 320                        | 2 650                          | 0,33                | 2,05           | 3,05           | 2              | 285                   |
| 880                          | 2 030                          | 0,29                | 2,33           | 3,47           | 2,28           | 223                   |
| 1 470                        | 3 350                          | 0,31                | 2,2            | 3,27           | 2,15           | 365                   |
| 770                          | 1 790                          | 0,37                | 1,81           | 2,7            | 1,77           | 200                   |
| 3 300                        | 6 500                          | 0,44                | 1,55           | 2,31           | 1,52           | 670                   |
| 2 320                        | 4 700                          | 0,37                | 1,81           | 2,7            | 1,77           | 495                   |
| 2 320                        | 4 700                          | 0,37                | 1,81           | 2,7            | 1,77           | 495                   |
| 2 320                        | 4 700                          | 0,37                | 1,81           | 2,7            | 1,77           | 495                   |
| 2 320                        | 4 650                          | 0,37                | 1,81           | 2,7            | 1,77           | –                     |
| 3 250                        | 6 600                          | 0,35                | 1,95           | 2,9            | 1,91           | 680                   |
| 1 280                        | 3 000                          | 0,41                | 1,66           | 2,47           | 1,62           | 320                   |
| 1 220                        | 2 500                          | 0,44                | 1,53           | 2,28           | 1,5            | 265                   |
| 1 980                        | 4 300                          | 0,43                | 1,55           | 2,31           | 1,52           | 450                   |
| 1 920                        | 4 200                          | 0,43                | 1,55           | 2,31           | 1,52           | 440                   |
| 2 160                        | 4 650                          | 0,35                | 1,95           | 2,9            | 1,91           | 485                   |
| 1 870                        | 3 550                          | 0,33                | 2,02           | 3              | 1,97           | 360                   |
| 2 850                        | 5 500                          | 0,28                | 2,41           | 3,59           | 2,36           | 560                   |
| 3 800                        | 7 500                          | 0,43                | 1,57           | 2,34           | 1,53           | –                     |
| 3 850                        | 7 600                          | 0,43                | 1,57           | 2,34           | 1,53           | 760                   |
| 3 800                        | 7 500                          | 0,43                | 1,57           | 2,34           | 1,53           | –                     |
| 3 800                        | 7 500                          | 0,43                | 1,57           | 2,34           | 1,53           | –                     |
| 2 050                        | 4 600                          | 0,46                | 1,47           | 2,19           | 1,44           | 475                   |
| 3 900                        | 7 800                          | 0,45                | 1,5            | 2,24           | 1,47           | –                     |

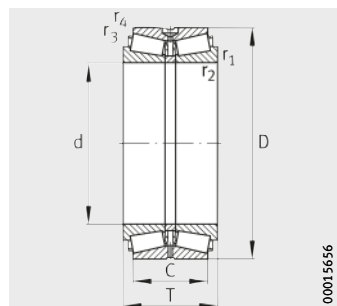


# Tapered roller bearings

Double row,  
O arrangement



Design 6



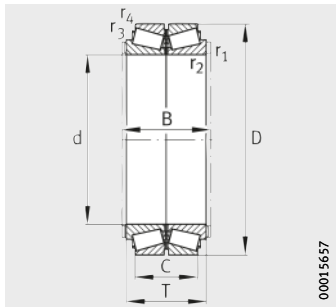
Design 7

Dimension table (continued) · Dimensions in mm

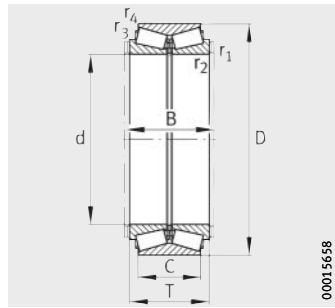
| Designation  | Design           | Mass<br>m<br>≈kg | Dimensions     |        |         |         |   |   |
|--------------|------------------|------------------|----------------|--------|---------|---------|---|---|
|              |                  |                  | d              | D      | T       | C       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-511990.TR2 | 7                | 63,8             | <b>300</b>     | 420    | 159     | 128     | 4                                       | 1                                       |
| Z-565735.TR2 | 6                | 121              | <b>300</b>     | 500    | 180     | 125     | 9,5                                     | 2,5                                     |
| Z-511991.TR2 | 7                | 145              | <b>300</b>     | 500    | 205     | 152     | 6                                       | 2,5                                     |
| Z-532655.TR2 | 6                | 72,6             | <b>340</b>     | 460    | 160     | 128     | 4                                       | 1,5                                     |
| Z-549929.TR2 | 6                | 126              | <b>340</b>     | 520    | 180     | 135     | 6                                       | 2                                       |
| Z-511992.TR2 | 6                | 228              | <b>340</b>     | 580    | 242     | 170     | 6                                       | 2                                       |
| Z-541911.TR2 | 7                | 208              | <b>350</b>     | 590    | 200     | 140     | 12                                      | 2,5                                     |
| Z-511993.TR2 | 7                | 73,3             | <b>360</b>     | 480    | 160     | 128     | 4                                       | 1,5                                     |
| Z-525858.TR2 | 6                | 135              | <b>360</b>     | 540    | 185     | 140     | 5                                       | 1,5                                     |
| Z-566764.TR2 | 10 <sup>1)</sup> | 540              | <b>367,5</b>   | 647,7  | 410     | 336     | 4,8                                     | 3,3                                     |
| Z-566765.TR2 | 11 <sup>1)</sup> | 540              | <b>367,5</b>   | 647,7  | 410     | 336     | 4,8                                     | 3,2                                     |
| Z-538179.TR2 | 7                | 86,4             | <b>380</b>     | 520    | 149     | 112     | 5                                       | 2                                       |
| Z-511994.TR2 | 6                | 244              | <b>380</b>     | 620    | 242     | 170     | 5                                       | 2                                       |
| F-808453.TR2 | 7                | 236              | <b>381</b>     | 590,55 | 245     | 190     | 6,4                                     | 1,5                                     |
| Z-565736.TR2 | 6                | 146              | <b>400</b>     | 590    | 185     | 125     | 6                                       | 2,5                                     |
| Z-511995.TR2 | 7                | 183              | <b>400</b>     | 600    | 206     | 150     | 6                                       | 2                                       |
| Z-549965.TR2 | 7                | 192              | <b>420</b>     | 620    | 206     | 150     | 6                                       | 5                                       |
| Z-511996.TR2 | 7                | 365              | <b>420</b>     | 700    | 275     | 200     | 6                                       | 2                                       |
| Z-511997.TR2 | 7                | 219              | <b>440</b>     | 650    | 212     | 152     | 8                                       | 3                                       |
| Z-579097.TR2 | 11 <sup>1)</sup> | 244              | <b>447,675</b> | 635    | 257,175 | 206,375 | 6,4                                     | 1,5                                     |
| Z-549964.TR2 | 7                | 135              | <b>460</b>     | 620    | 170     | 131     | 5                                       | 4                                       |
| Z-534866.TR2 | 7                | 255              | <b>460</b>     | 680    | 230     | 175     | 7,5                                     | 3                                       |
| Z-511998.TR2 | 7                | 152              | <b>480</b>     | 650    | 180     | 130     | 5                                       | 2                                       |
| Z-573216.TR2 | 10 <sup>1)</sup> | 255              | <b>480</b>     | 680    | 238     | 190     | 4                                       | 3                                       |
| Z-541912.TR2 | 7                | 141              | <b>490</b>     | 640    | 180     | 144     | 9,5                                     | 3                                       |
| Z-539031.TR2 | 7                | 162              | <b>500</b>     | 670    | 180     | 130     | 5                                       | 2                                       |
| Z-544199.TR2 | 6                | 281              | <b>500</b>     | 720    | 236     | 180     | 7,5                                     | 3                                       |
| Z-539117.TR2 | 7                | 225              | <b>520</b>     | 740    | 190     | 120     | 3                                       | 3                                       |
| Z-510043.TR2 | 7                | 189              | <b>530</b>     | 710    | 190     | 136     | 6                                       | 2,5                                     |
| Z-532951.TR2 | 7                | 236              | <b>560</b>     | 750    | 213     | 156     | 6                                       | 2,5                                     |
| Z-578732.TR2 | 7                | 418              | <b>560</b>     | 820    | 260     | 185     | 7,5                                     | 3                                       |
| Z-541806.TR2 | 6                | 416              | <b>560</b>     | 820    | 270     | 190     | 9,5                                     | 3                                       |

<sup>1)</sup> With pin cages.





Design 10



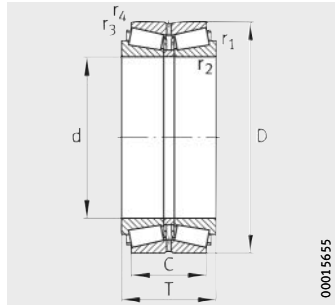
Design 11

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     |
| 1 560               | 3 850                   | 0,32                | 2,12  | 3,15  | 2,07  | 395                |
| 2 270               | 4 150                   | 0,26                | 2,55  | 3,8   | 2,5   | 400                |
| 2 700               | 5 300                   | 0,37                | 1,8   | 2,69  | 1,76  | 510                |
| 1 890               | 4 850                   | 0,4                 | 1,69  | 2,52  | 1,65  | 485                |
| 2 270               | 4 850                   | 0,31                | 2,21  | 3,28  | 2,16  | 465                |
| 3 350               | 6 300                   | 0,47                | 1,44  | 2,15  | 1,41  | 590                |
| 2 850               | 5 400                   | 0,56                | 1,2   | 1,79  | 1,18  | 495                |
| 1 910               | 4 700                   | 0,32                | 2,11  | 3,14  | 2,06  | 460                |
| 2 550               | 5 500                   | 0,3                 | 2,25  | 3,35  | 2,2   | –                  |
| 7 400               | 16 000                  | 0,29                | 2,32  | 3,45  | 2,26  | 1 470              |
| 7 400               | 16 000                  | 0,29                | 2,32  | 3,45  | 2,26  | 1 470              |
| 1 590               | 3 900                   | 0,36                | 1,86  | 2,76  | 1,81  | 370                |
| 3 650               | 7 100                   | 0,46                | 1,47  | 2,19  | 1,44  | 640                |
| 3 350               | 8 300                   | 0,34                | 1,98  | 2,94  | 1,93  | –                  |
| 2 550               | 5 300                   | 0,33                | 2,05  | 3,05  | 2     | 480                |
| 3 000               | 6 600                   | 0,46                | 1,45  | 2,16  | 1,42  | 610                |
| 2 900               | 6 400                   | 0,43                | 1,58  | 2,36  | 1,55  | 580                |
| 4 700               | 9 200                   | 0,42                | 1,6   | 2,38  | 1,56  | 800                |
| 3 100               | 6 800                   | 0,48                | 1,42  | 2,11  | 1,39  | 610                |
| 4 300               | 10 600                  | 0,33                | 2,07  | 3,09  | 2,03  | –                  |
| 2 500               | 6 100                   | 0,38                | 1,77  | 2,63  | 1,73  | 550                |
| 3 850               | 8 800                   | 0,31                | 2,18  | 3,24  | 2,13  | 780                |
| 2 600               | 6 400                   | 0,4                 | 1,69  | 2,52  | 1,65  | 570                |
| 4 150               | 10 600                  | 0,32                | 2,12  | 3,15  | 2,07  | –                  |
| 2 600               | 6 400                   | 0,4                 | 1,69  | 2,52  | 1,65  | 570                |
| 2 600               | 6 600                   | 0,41                | 1,63  | 2,43  | 1,6   | 580                |
| 4 000               | 9 400                   | 0,33                | 2,04  | 3,04  | 2     | 810                |
| 2 550               | 5 700                   | 0,48                | 1,42  | 2,11  | 1,39  | 480                |
| 3 100               | 7 900                   | 0,41                | 1,65  | 2,45  | 1,61  | 680                |
| 3 050               | 8 000                   | 0,43                | 1,56  | 2,32  | 1,52  | 680                |
| 4 750               | 11 400                  | 0,49                | 1,38  | 2,05  | 1,35  | 950                |
| 4 750               | 11 400                  | 0,49                | 1,38  | 2,05  | 1,35  | 950                |

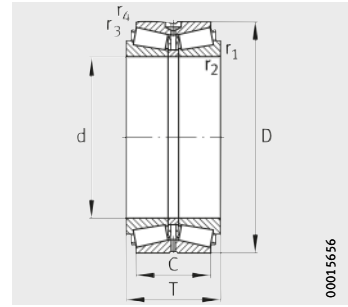


# Tapered roller bearings

Double row,  
O arrangement



Design 6



Design 7

**Dimension table** (continued) · Dimensions in mm

| Designation  | Design          | Mass<br>m<br>≈kg | Dimensions   |       |       |     |   |   |
|--------------|-----------------|------------------|--------------|-------|-------|-----|---|---|
|              |                 |                  | d            | D     | T     | C   | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-538181.TR2 | 7               | 262              | <b>600</b>   | 800   | 208,5 | 160 | 6                                       | 2,5                                     |
| Z-538183.TR2 | 7               | 473              | <b>600</b>   | 870   | 270   | 198 | 7,5                                     | 3                                       |
| Z-538182.TR2 | 7               | 293              | <b>630</b>   | 850   | 242   | 182 | 7,5                                     | 2,5                                     |
| Z-510041.TR2 | 7               | 422              | <b>710</b>   | 950   | 240   | 175 | 7,5                                     | 3                                       |
| Z-534867.TR2 | 6               | 753              | <b>710</b>   | 1 030 | 315   | 220 | 9,5                                     | 4                                       |
| Z-564801.TR2 | 7               | 587              | <b>800</b>   | 1 060 | 270   | 204 | 6                                       | 2,5                                     |
| Z-538339.TR2 | 7               | 638              | <b>850</b>   | 1 120 | 268   | 190 | 7,5                                     | 3                                       |
| Z-538341.TR2 | 7               | 883              | <b>950</b>   | 1 250 | 298   | 220 | 9,5                                     | 4                                       |
| Z-568323.TR2 | 6 <sup>1)</sup> | 813              | <b>1 250</b> | 1 500 | 250   | 190 | 6                                       | 1,5                                     |
| Z-572139.TR2 | 6 <sup>1)</sup> | 1 390            | <b>1 450</b> | 1 770 | 290   | 170 | 9,5                                     | 5                                       |

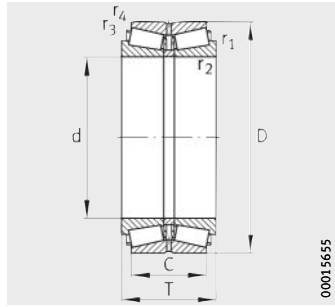
<sup>1)</sup> With pin cages.

| Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    |
|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|
| dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN |
| 3 700                        | 9 100                          | 0,32                | 2,08           | 3,1            | 2,04           | 750                   |
| 5 200                        | 12 300                         | 0,41                | 1,66           | 2,47           | 1,62           | 1 000                 |
| 4 450                        | 11 500                         | 0,4                 | 1,69           | 2,52           | 1,65           | 940                   |
| 5 100                        | 13 000                         | 0,46                | 1,47           | 2,19           | 1,44           | 1 030                 |
| 7 200                        | 17 000                         | 0,43                | 1,57           | 2,34           | 1,53           | 1 300                 |
| 6 100                        | 16 400                         | 0,35                | 1,95           | 2,9            | 1,91           | 1 250                 |
| 5 600                        | 15 500                         | 0,46                | 1,45           | 2,16           | 1,42           | 1 170                 |
| 7 500                        | 21 300                         | 0,32                | 2,12           | 3,15           | 2,07           | 1 550                 |
| 7 100                        | 24 100                         | 0,37                | 1,8            | 2,69           | 1,76           | 1 650                 |
| 7 600                        | 26 500                         | 0,87                | 0,78           | 1,16           | 0,76           | 1 710                 |

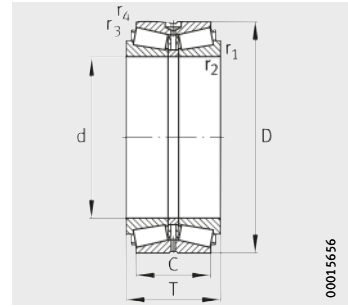


# Tapered roller bearings

Double row,  
O arrangement,  
in inch sizes



Design 6



Design 7

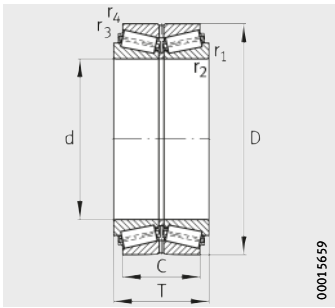
Dimension table - Dimensions in mm

| Designation     | Design          | Mass<br>m<br>≈kg | Dimensions     |         |         |         |   |   |
|-----------------|-----------------|------------------|----------------|---------|---------|---------|---|---|
|                 |                 |                  | d              | D       | T       | C       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-523062.TR2    | 7               | 69,8             | <b>206,375</b> | 336,55  | 211,138 | 169,862 | 3,3                                     | 1,5                                     |
| Z-503656.TR2    | 7               | 50,7             | <b>228,6</b>   | 355,6   | 146,05  | 111,125 | 6,8                                     | 1,5                                     |
| Z-514401.TR2    | 6               | 52,8             | <b>228,6</b>   | 355,6   | 152,4   | 114,3   | 6,4                                     | 1,5                                     |
| Z-518468.TR2    | 6               | 53,6             | <b>228,6</b>   | 355,6   | 152,4   | 111,125 | 6,9                                     | 1,5                                     |
| Z-515125.TR2    | 7               | 205              | <b>228,6</b>   | 488,95  | 254     | 152,4   | 6,4                                     | 1,5                                     |
| Z-547139.TR2    | 6 <sup>2)</sup> | 27,2             | <b>234,95</b>  | 327,025 | 117,475 | 82,55   | 6,4                                     | 1,6                                     |
| Z-547957.TR2    | 6 <sup>2)</sup> | 27,8             | <b>234,95</b>  | 328,625 | 117,475 | 82,55   | 6,4                                     | 1,5                                     |
| Z-517152.TR2    | 6 <sup>2)</sup> | 24,4             | <b>253,975</b> | 347,662 | 101,6   | 69,85   | 3,6                                     | 1,5                                     |
| Z-505612.TR2    | 7               | 44,4             | <b>254</b>     | 358,775 | 152,4   | 117,475 | 3,6                                     | 1,5                                     |
| F-804367.TR2    | 8 <sup>1)</sup> | 86,3             | <b>254</b>     | 422,275 | 173,038 | 128,588 | 6,9                                     | 1,5                                     |
| Z-515129.TR2    | 6               | 259              | <b>254</b>     | 533,4   | 276,225 | 165,1   | 6,4                                     | 1,5                                     |
| Z-514599.TR2    | 6               | 85,5             | <b>260,35</b>  | 422,275 | 178,592 | 139,7   | 6,9                                     | 1,5                                     |
| Z-535605.TR2    | 6 <sup>2)</sup> | 25,9             | <b>266,7</b>   | 352,425 | 107,95  | 82,55   | 6,4                                     | 1,5                                     |
| Z-524440.01.TR2 | 7               | 42               | <b>285,75</b>  | 380,898 | 139,7   | 107,95  | 3,6                                     | 1,5                                     |
| Z-525830.TR2    | 6               | 139              | <b>285,75</b>  | 501,65  | 203,2   | 120,65  | 6,4                                     | 3,3                                     |
| Z-505614.01.TR2 | 7               | 62,6             | <b>288,925</b> | 406,4   | 165,1   | 130,175 | 6,4                                     | 1,5                                     |
| Z-526864.TR2    | 6               | 71,2             | <b>300,038</b> | 422,275 | 174,625 | 136,525 | 6,4                                     | 1,5                                     |
| Z-539192.TR2    | 6 <sup>2)</sup> | 33,3             | <b>304,8</b>   | 393,7   | 107,95  | 82,55   | 6,4                                     | 1,5                                     |
| Z-527128.TR2    | 7               | 73,8             | <b>304,8</b>   | 438,048 | 165,1   | 120,65  | 6,4                                     | 1,5                                     |
| Z-512601.TR2    | 6               | 172              | <b>311,15</b>  | 558,8   | 190,5   | 111,125 | 9,7                                     | 3,3                                     |
| Z-521746.TR2    | 7               | 59,8             | <b>317,5</b>   | 444,5   | 146,05  | 98,425  | 7,9                                     | 1,5                                     |
| Z-510607.01.TR2 | 7               | 85               | <b>317,5</b>   | 447,675 | 180,975 | 146,05  | 3,6                                     | 1,5                                     |
| Z-515495.TR2    | 7               | 96,6             | <b>330,2</b>   | 482,6   | 177,8   | 127     | 6,4                                     | 1,5                                     |
| Z-526831.TR2    | 7               | 97,8             | <b>333,375</b> | 469,9   | 190,5   | 152,4   | 6,4                                     | 1,5                                     |
| F-807462.TR2    | 8 <sup>1)</sup> | 113              | <b>346,075</b> | 488,95  | 200,025 | 158,75  | 6,4                                     | 1,5                                     |
| Z-505613.01.TR2 | 7               | 113              | <b>346,075</b> | 488,95  | 200,025 | 158,75  | 6,4                                     | 1,5                                     |
| F-804108.TR2    | 8 <sup>1)</sup> | 43,4             | <b>355,6</b>   | 444,5   | 127     | 101,6   | 3,6                                     | 1,5                                     |
| Z-523319.TR2    | 7               | 45               | <b>355,6</b>   | 444,5   | 136,525 | 111,125 | 3,6                                     | 1,5                                     |
| F-807283.TR2    | 8 <sup>1)</sup> | 78,2             | <b>355,6</b>   | 501,65  | 154     | 107,95  | 6,4                                     | 1,6                                     |
| Z-510608.01.TR2 | 6               | 83,9             | <b>355,6</b>   | 501,65  | 155,575 | 107,95  | 6,4                                     | 1,5                                     |
| Z-581099.TR2    | 9               | 141              | <b>368,249</b> | 523,875 | 214,312 | 169,862 | 6,4                                     | 1,5                                     |
| Z-573335.TR2    | 7               | 184              | <b>368,3</b>   | 596,9   | 203,2   | 133,35  | 9,7                                     | 2,4                                     |

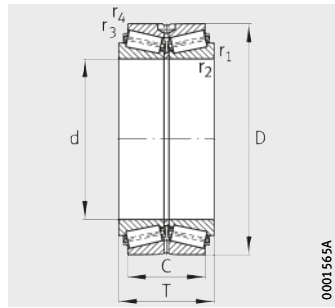
<sup>1)</sup> Without intermediate ring.

<sup>2)</sup> Without intermediate ring, with lubrication groove in the inner and outer ring.

<sup>3)</sup> The comparative designations were taken from documents available to us.  
They give information on identical main dimensions and chamfer dimensions only.  
The cage and bearing designs are not always identical.  
Furthermore, the table makes no claims to completeness.



Design 8  
With pin cage



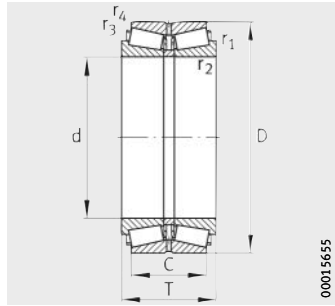
Design 9  
With pin cage

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Interchange designation <sup>3)</sup><br>TDO types |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{Or}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |
| 1 920               | 4 000                   | 0,34                | 2     | 2,98  | 1,96  | 445                                  | H242649.610CD                                      |
| 1 120               | 2 600                   | 0,59                | 1,14  | 1,7   | 1,12  | 285                                  | NA130902.131401D                                   |
| 1 120               | 2 600                   | 0,59                | 1,14  | 1,7   | 1,12  | 285                                  | HM746646.610D                                      |
| 1 120               | 2 600                   | 0,59                | 1,14  | 1,7   | 1,12  | 285                                  | 130902.131401D                                     |
| 2 600               | 4 500                   | 0,94                | 0,72  | 1,07  | 0,7   | 440                                  | HH949549.510CD                                     |
| 830                 | 1 960                   | 0,41                | 1,66  | 2,47  | 1,62  | –                                    | NA8575SW.8520D                                     |
| 830                 | 1 960                   | 0,41                | 1,66  | 2,47  | 1,62  | –                                    | NA8575SW.8522D                                     |
| 820                 | 1 720                   | 0,33                | 2,03  | 3,02  | 1,98  | 182                                  | LM249747NW.LM249710CD                              |
| 1 360               | 3 150                   | 0,34                | 1,98  | 2,95  | 1,94  | 335                                  | M249749.710CD                                      |
| 1 870               | 3 550                   | 0,33                | 2,02  | 3     | 1,97  | 360                                  | HM252344NW.HM252311D                               |
| 3 450               | 5 700                   | 0,87                | 0,78  | 1,16  | 0,76  | 530                                  | HH953749.710D                                      |
| 1 870               | 3 550                   | 0,33                | 2,02  | 3     | 1,97  | 360                                  | HM252349.310D                                      |
| 880                 | 2 160                   | 0,32                | 2,12  | 3,15  | 2,07  | –                                    | LM251649NW.LM251610D                               |
| 1 180               | 3 200                   | 0,43                | 1,56  | 2,33  | 1,53  | –                                    | LM654649.610CD                                     |
| 2 220               | 3 850                   | 0,78                | 0,87  | 1,29  | 0,85  | 365                                  | EE147112.198D                                      |
| 1 730               | 4 100                   | 0,35                | 1,94  | 2,89  | 1,9   | 430                                  | M255449.410CD                                      |
| 1 790               | 4 350                   | 0,36                | 1,86  | 2,77  | 1,82  | 450                                  | HM256849.810D                                      |
| 980                 | 2 550                   | 0,36                | 1,88  | 2,8   | 1,84  | 260                                  | L357049NW.L357010D                                 |
| 1 350               | 3 200                   | 0,4                 | 1,69  | 2,52  | 1,65  | 325                                  | EE129120X.173CD                                    |
| 2 210               | 4 000                   | 0,88                | 0,76  | 1,14  | 0,75  | 370                                  | EE148122.220D                                      |
| 1 250               | 2 800                   | 0,38                | 1,79  | 2,67  | 1,75  | 280                                  | EE291250.751CD                                     |
| 2 070               | 5 200                   | 0,33                | 2,03  | 3,02  | 1,98  | 520                                  | HM259049.010CD                                     |
| 2 070               | 4 500                   | 0,47                | 1,43  | 2,12  | 1,4   | 440                                  | EE526130.191CD                                     |
| 2 120               | 5 400                   | 0,38                | 1,79  | 2,67  | 1,75  | 540                                  | HM261049.010CD                                     |
| 2 480               | 6 300                   | 0,33                | 2,03  | 3,02  | 1,98  | 620                                  | –  |
| 2 480               | 6 300                   | 0,33                | 2,03  | 3,02  | 1,98  | 620                                  | HM262749.710CD                                     |
| 1 210               | 3 600                   | 0,31                | 2,2   | 3,27  | 2,15  | –                                    | TIMKENSERIE L163100                                |
| 1 250               | 3 750                   | 0,31                | 2,2   | 3,27  | 2,15  | –                                    | L163149.110CD                                      |
| 1 620               | 3 650                   | 0,44                | 1,53  | 2,28  | 1,5   | 345                                  | –  |
| 1 620               | 3 650                   | 0,44                | 1,53  | 2,28  | 1,5   | 345                                  | EE231400.231976CD                                  |
| 2 750               | 6 800                   | 0,35                | 1,92  | 2,86  | 1,88  | 660                                  | HM265049.010CD                                     |
| 2 850               | 5 500                   | 0,42                | 1,62  | 2,42  | 1,59  | 495                                  | EE181453.351CD                                     |

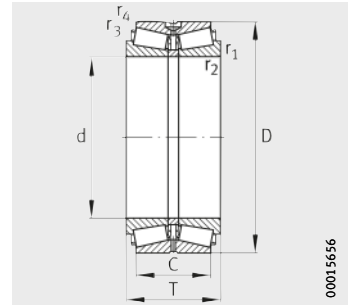


# Tapered roller bearings

Double row,  
O arrangement,  
in inch sizes



Design 6



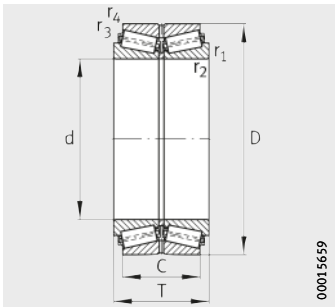
Design 7

Dimension table (continued) · Dimensions in mm

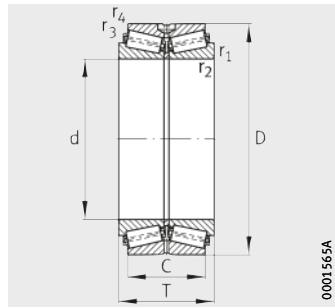
| Designation     | Design          | Mass<br>m<br>≈kg | Dimensions     |         |         |         |   |   |
|-----------------|-----------------|------------------|----------------|---------|---------|---------|---|---|
|                 |                 |                  | d              | D       | T       | C       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-527366.TR2    | 7               | 73,7             | <b>371,475</b> | 501,65  | 155,575 | 107,95  | 6,4                                     | 1,5                                     |
| Z-526251.TR2    | 6               | 66,8             | <b>381</b>     | 508     | 139,7   | 88,9    | 6,4                                     | 1,5                                     |
| Z-547099.TR2    | 7               | 238              | <b>381</b>     | 590,55  | 244,475 | 193,675 | 6,4                                     | 1,5                                     |
| Z-581097.TR2    | 9               | 247              | <b>381</b>     | 590,55  | 244,475 | 193,675 | 6,4                                     | 1,5                                     |
| Z-505615.TR2    | 6               | 159              | <b>384,175</b> | 546,1   | 222,25  | 177,8   | 6,4                                     | 1,5                                     |
| Z-579745.TR2    | 9               | 159              | <b>384,175</b> | 546,1   | 222,25  | 177,8   | 6,4                                     | 1,5                                     |
| Z-505611.02.TR2 | 6               | 96,5             | <b>396,875</b> | 546,1   | 158,75  | 117,475 | 6,4                                     | 1,5                                     |
| Z-525845.TR2    | 7               | 117              | <b>406,4</b>   | 546,1   | 185,738 | 147,638 | 6,4                                     | 1,5                                     |
| Z-507670.TR2    | 6 <sup>1)</sup> | 110              | <b>406,4</b>   | 574,675 | 157,162 | 106,362 | 6,4                                     | 1,5                                     |
| Z-515494.TR2    | 7               | 167              | <b>406,4</b>   | 609,524 | 177,8   | 133,35  | 8,1                                     | 1,5                                     |
| Z-578129.TR2    | 9               | 207              | <b>415,925</b> | 590,55  | 244,475 | 193,675 | 6,4                                     | 1,5                                     |
| Z-517498.01.TR2 | 7               | 200              | <b>415,925</b> | 590,55  | 244,475 | 193,675 | 6,4                                     | 1,5                                     |
| Z-517498.TR2    | 6               | 200              | <b>415,925</b> | 590,55  | 244,475 | 193,675 | 6,4                                     | 1,5                                     |
| Z-527127.TR2    | 7               | 95,5             | <b>431,8</b>   | 571,5   | 155,575 | 111,125 | 3,3                                     | 1,5                                     |
| Z-512346.TR2    | 6               | 241              | <b>447,675</b> | 635     | 257,175 | 206,375 | 6,4                                     | 1,6                                     |
| Z-521467.01.TR2 | 7               | 241              | <b>447,675</b> | 635     | 257,175 | 206,375 | 6,4                                     | 1,5                                     |
| Z-579097.TR2    | 8               | 244              | <b>447,675</b> | 635     | 257,175 | 206,375 | 6,4                                     | 1,5                                     |
| Z-529635.TR2    | 7               | 110              | <b>457,2</b>   | 596,9   | 165,1   | 120,65  | 9,7                                     | 1,5                                     |
| Z-541705.TR2    | 7               | 238              | <b>457,2</b>   | 660,4   | 228,6   | 171,45  | 6,4                                     | 1,5                                     |
| Z-578647.TR2    | 9               | 304              | <b>479,425</b> | 679,45  | 276,225 | 222,25  | 6,4                                     | 1,5                                     |
| Z-517499.02.TR2 | 7               | 299              | <b>479,425</b> | 679,45  | 276,225 | 222,25  | 6,4                                     | 1,5                                     |
| Z-515917.01.TR2 | 7               | 135              | <b>488,95</b>  | 634,873 | 180,975 | 136,525 | 6,4                                     | 1,5                                     |
| Z-505610.TR2    | 6               | 184              | <b>488,95</b>  | 660,4   | 206,375 | 158,75  | 6,4                                     | 1,5                                     |
| Z-515127.01.TR2 | 7               | 122              | <b>498,475</b> | 634,873 | 177,8   | 142,875 | 6,4                                     | 1,5                                     |
| Z-528996.TR2    | 7               | 344              | <b>501,65</b>  | 711,2   | 292,1   | 231,775 | 6,4                                     | 1,5                                     |
| Z-578586.TR2    | 9               | 354              | <b>501,65</b>  | 711,2   | 292,1   | 231,775 | 6,4                                     | 1,5                                     |
| Z-518884.TR2    | 6               | 589              | <b>508</b>     | 838,2   | 304,8   | 222,25  | 9,7                                     | 3,3                                     |
| Z-528407.TR2    | 7               | 210              | <b>520,7</b>   | 736,6   | 186,502 | 114,3   | 6,4                                     | 1,5                                     |
| Z-581098.TR2    | 9               | 427              | <b>536,575</b> | 761,873 | 311,15  | 247,65  | 6,4                                     | 1,5                                     |
| Z-577417.TR2    | 9               | 431              | <b>536,575</b> | 761,873 | 311,15  | 247,65  | 6,4                                     | 1,5                                     |
| Z-536948.01.TR2 | 7               | 191              | <b>558,8</b>   | 736,6   | 187,328 | 138,112 | 6,4                                     | 1,5                                     |
| Z-521229.02.TR2 | 7               | 244              | <b>558,8</b>   | 736,6   | 225,425 | 177,8   | 6,4                                     | 1,5                                     |
| Z-541361.TR2    | 9               | 255              | <b>558,8</b>   | 736,6   | 225,425 | 177,8   | 6,4                                     | 1,5                                     |

<sup>1)</sup> Without intermediate ring.

<sup>2)</sup> The comparative designations were taken from documents available to us. They give information on identical main dimensions and chamfer dimensions only. The cage and bearing designs are not always identical. Furthermore, the table makes no claims to completeness.



Design 8  
With pin cage



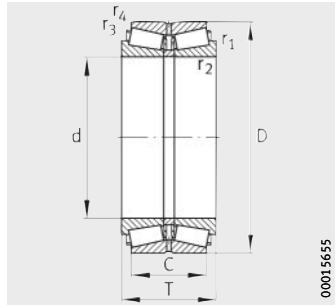
Design 9  
With pin cage

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load | Interchange designation <sup>2)</sup> |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|---------------------------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     | TDO types                             |
| 1 600               | 3 650                   | 0,44                | 1,53  | 2,28  | 1,5   | –                  | EE231462.976CD                        |
| 1 280               | 3 200                   | 0,53                | 1,27  | 1,89  | 1,24  | 305                | EE192150.201CD                        |
| 3 350               | 8 300                   | 0,34                | 1,98  | 2,94  | 1,93  | –                  | M268730.710CD                         |
| 3 550               | 8 900                   | 0,34                | 1,98  | 2,94  | 1,93  | 820                | M268730.710CD                         |
| 3 050               | 7 800                   | 0,33                | 2,03  | 3,02  | 1,98  | –                  | HM266449.HM410CD                      |
| 3 050               | 7 900                   | 0,33                | 2,03  | 3,02  | 1,98  | 750                | HM266449.410CD                        |
| 1 770               | 4 250                   | 0,47                | 1,43  | 2,12  | 1,4   | 390                | EE234156.216D                         |
| 2 260               | 6 200                   | 0,45                | 1,5   | 2,24  | 1,47  | 590                | M667944.911CD                         |
| 1 690               | 3 650                   | 0,51                | 1,31  | 1,96  | 1,28  | 325                | NA285160.228D                         |
| 2 470               | 5 500                   | 0,47                | 1,44  | 2,15  | 1,41  | 495                | EE736160.239CD                        |
| 3 550               | 8 900                   | 0,34                | 1,98  | 2,94  | 1,93  | 820                | M268749.710CD                         |
| 3 600               | 9 150                   | 0,33                | 2,03  | 3,02  | 1,98  | –                  | M268749.710CD                         |
| 3 600               | 9 150                   | 0,33                | 2,03  | 3,02  | 1,98  | –                  | M268749.710CD                         |
| 2 000               | 4 800                   | 0,55                | 1,24  | 1,84  | 1,21  | 445                | LM869448.410CD                        |
| 4 200               | 10 400                  | 0,33                | 2,07  | 3,09  | 2,03  | 940                | M270749.M270710D                      |
| 4 200               | 10 400                  | 0,33                | 2,07  | 3,09  | 2,03  | 940                | M270749.710CD                         |
| 4 300               | 10 700                  | 0,33                | 2,07  | 3,09  | 2,03  | 970                | M270749.M270710D                      |
| 2 040               | 5 600                   | 0,4                 | 1,68  | 2,51  | 1,65  | 510                | EE244180.236CD                        |
| 3 750               | 9 000                   | 0,35                | 1,95  | 2,9   | 1,91  | 800                | M271648.610CD                         |
| 4 600               | 11 900                  | 0,35                | 1,92  | 2,86  | 1,88  | 1 060              | M272749.710CD                         |
| 4 650               | 12 200                  | 0,33                | 2,03  | 3,02  | 1,98  | –                  | M272749.710CD                         |
| 2 490               | 6 700                   | 0,47                | 1,43  | 2,12  | 1,4   | 600                | LM772748.710CD                        |
| 2 550               | 6 800                   | 0,45                | 1,5   | 2,23  | 1,46  | 610                | EE640192.261D                         |
| 2 010               | 5 600                   | 0,43                | 1,58  | 2,35  | 1,54  | 500                | EE243196.251CD                        |
| 4 900               | 12 800                  | 0,35                | 1,92  | 2,86  | 1,88  | 1 130              | M274149.110CD                         |
| 5 000               | 13 200                  | 0,35                | 1,92  | 2,86  | 1,88  | 1 160              | M274149.110CD                         |
| 5 500               | 11 900                  | 0,49                | 1,38  | 2,06  | 1,35  | 1 000              | EE426200.331D                         |
| 2 550               | 5 700                   | 0,48                | 1,42  | 2,11  | 1,39  | 480                | EE982051.901CD                        |
| 6 000               | 15 300                  | 0,3                 | 2,28  | 3,39  | 2,23  | –                  | M276449.410CD                         |
| 6 100               | 15 400                  | 0,3                 | 2,28  | 3,39  | 2,23  | 1 330              | M276449.410CD                         |
| 2 950               | 7 600                   | 0,34                | 1,98  | 2,94  | 1,93  | 640                | EE843220.291CD                        |
| 3 900               | 11 000                  | 0,35                | 1,95  | 2,9   | 1,91  | 940                | LM377449.410CD                        |
| 3 950               | 11 200                  | 0,35                | 1,95  | 2,9   | 1,91  | 960                | LM377449.410CD                        |

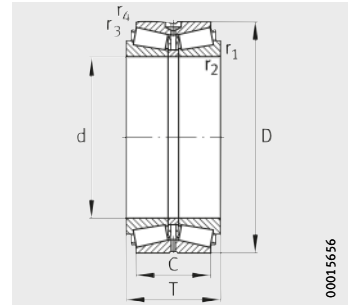


# Tapered roller bearings

Double row,  
O arrangement,  
in inch sizes



Design 6



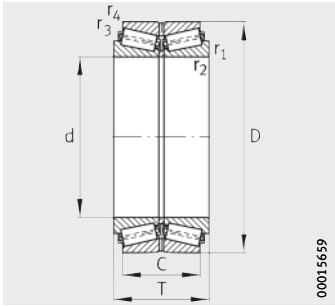
Design 7

Dimension table (continued) · Dimensions in mm

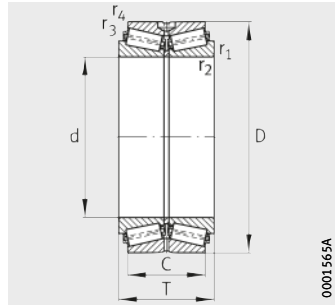
| Designation  | Design | Mass<br>m<br>≈kg | Dimensions     |         |         |         |   |   |
|--------------|--------|------------------|----------------|---------|---------|---------|---|---|
|              |        |                  | d              | D       | T       | C       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-536529.TR2 | 7      | 514              | <b>571,5</b>   | 812,8   | 333,375 | 263,525 | 6,4                                     | 1,5                                     |
| Z-566721.TR2 | 9      | 535              | <b>571,5</b>   | 812,8   | 333,375 | 263,525 | 6,4                                     | 1,5                                     |
| Z-524528.TR2 | 7      | 248              | <b>602,945</b> | 787,4   | 206,375 | 158,75  | 6,4                                     | 1,5                                     |
| Z-513974.TR2 | 7      | 237              | <b>609,6</b>   | 787,4   | 206,375 | 158,75  | 6,4                                     | 1,5                                     |
| Z-533433.TR2 | 6      | 244              | <b>609,6</b>   | 812,8   | 190,5   | 146,05  | 6,4                                     | 3,3                                     |
| Z-574101.TR2 | 8      | 920              | <b>635</b>     | 990,6   | 339,725 | 212,725 | 6,4                                     | 1,5                                     |
| Z-514502.TR2 | 7      | 207              | <b>660,4</b>   | 812,8   | 203,2   | 158,75  | 6,4                                     | 1,5                                     |
| Z-512516.TR2 | 7      | 275              | <b>685,8</b>   | 876,3   | 200,025 | 152,4   | 6,4                                     | 1,5                                     |
| Z-521233.TR2 | 6      | 285              | <b>711,2</b>   | 914,4   | 190,5   | 139,7   | 6,4                                     | 1,5                                     |
| Z-512878.TR2 | 6      | 258              | <b>723,9</b>   | 914,4   | 187,325 | 139,7   | 5,6                                     | 1,5                                     |
| Z-514528.TR2 | 6      | 293              | <b>762</b>     | 965,2   | 187,325 | 133,35  | 6,4                                     | 1,5                                     |
| Z-512407.TR2 | 6      | 277              | <b>774,7</b>   | 965,2   | 187,325 | 133,35  | 6,4                                     | 1,5                                     |
| Z-576448.TR2 | 7      | 269              | <b>774,7</b>   | 965,2   | 187,325 | 133,35  | 6,4                                     | 1,5                                     |
| Z-521084.TR2 | 6      | 420              | <b>812,8</b>   | 1016    | 190,5   | 146,05  | 6,4                                     | 1,5                                     |
| Z-518817.TR2 | 6      | 430              | <b>812,8</b>   | 1066,8  | 190,5   | 146,05  | 6,4                                     | 3,3                                     |
| Z-512406.TR2 | 6      | 188              | <b>914,4</b>   | 1066,8  | 139,7   | 101,6   | 6,4                                     | 3,3                                     |
| Z-579565.TR2 | 8      | 200              | <b>914,4</b>   | 1066,8  | 139,7   | 101,6   | 6,4                                     | 3,3                                     |
| Z-579534.TR2 | 8      | 812              | <b>1 160</b>   | 1 430   | 240     | 180     | 9,5                                     | 5                                       |
| Z-563113.TR2 | 8      | 2 370            | <b>1 320,8</b> | 1 727,2 | 412,75  | 254     | 31                                      | 3                                       |

1) The comparative designations were taken from documents available to us. They give information on identical main dimensions and chamfer dimensions only. The cage and bearing designs are not always identical. Furthermore, the table makes no claims to completeness.





Design 8  
With pin cage



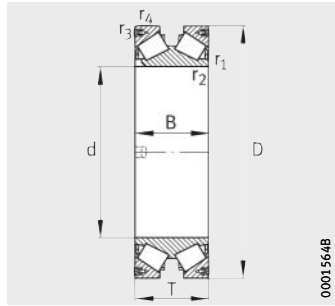
Design 9  
With pin cage

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load | Interchange designation <sup>1)</sup> |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|---------------------------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     | TDO types                             |
| 6 600               | 17 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 1 440              | M278749.710CD                         |
| 6 900               | 18 100                  | 0,33                | 2,03  | 3,02  | 1,98  | 1 530              | M278749.M278710CD                     |
| 3 100               | 9 000                   | 0,5                 | 1,35  | 2,01  | 1,32  | 760                | EE649237.311CD                        |
| 3 100               | 9 000                   | 0,5                 | 1,35  | 2,01  | 1,32  | 760                | EE649240.311CD                        |
| 3 150               | 8 200                   | 0,33                | 2,03  | 3,02  | 1,98  | 670                | EE743240.321D                         |
| 7 400               | 16 500                  | 0,87                | 0,78  | 1,16  | 0,76  | 1 260              | SKF BT28 332493                       |
| 3 550               | 10 600                  | 0,33                | 2,03  | 3,02  | 1,98  | –                  | L281148.110CD                         |
| 3 350               | 9 900                   | 0,41                | 1,66  | 2,47  | 1,62  | 810                | EE655270.346CD                        |
| 3 400               | 9 500                   | 0,38                | 1,77  | 2,63  | 1,73  | 750                | EE755280.361D                         |
| 3 400               | 9 500                   | 0,38                | 1,77  | 2,63  | 1,73  | 750                | EE755285.361CD                        |
| 3 500               | 10 100                  | 0,4                 | 1,67  | 2,49  | 1,63  | 780                | EE752300.381D                         |
| 3 500               | 10 100                  | 0,4                 | 1,67  | 2,49  | 1,63  | 780                | EE752305.381D                         |
| 3 500               | 10 100                  | 0,4                 | 1,67  | 2,49  | 1,63  | 780                | EE752305.381CD                        |
| 3 550               | 11 300                  | 0,48                | 1,42  | 2,11  | 1,38  | 880                | EE762320.401D                         |
| 3 550               | 11 300                  | 0,48                | 1,42  | 2,11  | 1,38  | 880                | EE762320.420XD                        |
| 2 400               | 7 700                   | 0,41                | 1,64  | 2,44  | 1,6   | 570                | LL686947.910D                         |
| 2 550               | 8 300                   | 0,41                | 1,64  | 2,44  | 1,6   | 620                | LL686947.910D                         |
| 6 700               | 23 000                  | 0,4                 | 1,68  | 2,5   | 1,64  | 1 600              | –                                     |
| 13 500              | 42 000                  | 0,83                | 0,81  | 1,21  | 0,79  | 2 750              | SKF BT2B 332495                       |

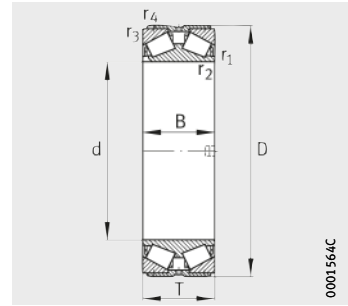


# Tapered roller bearings

Double row,  
X arrangement  
With large contact angle  
Axial bearings for work rolls



Design 12



Design 13

Dimension table - Dimensions in mm

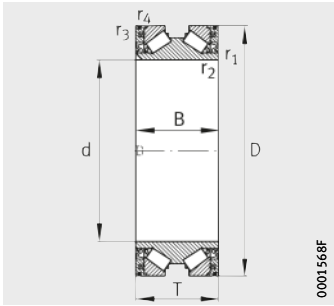
| Designation  | Design           | Mass<br>m<br>≈kg | Dimensions |        |         |         |   |   |
|--------------|------------------|------------------|------------|--------|---------|---------|---|---|
|              |                  |                  | d          | D      | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| F-803422.TR2 | 12               | 66               | 160        | 343    | 160     | 160     | 2                                       | 2                                       |
| F-801948.TR2 | 12               | 77,5             | 190        | 370    | 170     | 170     | 2                                       | 2                                       |
| F-801984.TR2 | 14               | 97               | 190        | 370    | 210     | 210     | 2                                       | 2                                       |
| F-800942.TR2 | 12               | 74,3             | 230        | 404    | 152     | 144     | 2                                       | 2                                       |
| F-803185.TR2 | 14               | 78               | 230        | 404    | 152     | 152     | 2                                       | 2                                       |
| F-803722.TR2 | 13               | 62               | 300        | 460    | 105     | 105     | 4                                       | 2                                       |
| F-801555.TR2 | 13               | 126              | 300        | 480    | 180     | 180     | 3                                       | 2                                       |
| F-801521.TR2 | 12               | 112              | 300        | 480    | 180     | 180     | 2                                       | 3                                       |
| F-801925.TR2 | 14 <sup>1)</sup> | 140              | 300        | 480    | 220     | 220     | 5                                       | 4                                       |
| F-801250.TR2 | 12               | 92,3             | 320        | 480    | 160     | 160     | 2                                       | 2                                       |
| F-801949.TR2 | 12               | 86,6             | 365,6      | 514,35 | 140     | 140     | 2                                       | 2                                       |
| F-804525.TR2 | 13               | 163              | 380        | 568    | 180     | 180     | 2                                       | 2                                       |
| F-801926.TR2 | 12               | 154              | 380        | 570    | 180     | 180     | 2                                       | 2                                       |
| F-801999.TR2 | 14 <sup>1)</sup> | 245              | 380        | 590    | 260     | 260     | 2,5                                     | 3                                       |
| Z-578815.TR2 | 13               | 150              | 390        | 568    | 180     | 180     | 2                                       | 2                                       |
| F-804510.TR2 | 14               | 136              | 390        | 570    | 180     | 180     | 4                                       | 7                                       |
| F-801249.TR2 | 12               | 145              | 390        | 570    | 180     | 180     | 2                                       | 2                                       |
| Z-579673.TR2 | 13               | 191              | 390        | 570    | 200     | 200     | 5                                       | 2                                       |
| F-800967.TR2 | 12               | 180              | 390        | 590    | 200     | 200     | 5                                       | 5                                       |
| F-801950.TR2 | 12               | 280              | 400        | 650    | 240     | 240     | 6                                       | 6                                       |
| F-803312.TR2 | 14 <sup>2)</sup> | 80               | 406,4      | 546,1  | 138,113 | 138,113 | 1,5                                     | 3                                       |
| F-801951.TR2 | 12               | 107              | 406,4      | 566,1  | 150     | 150     | 2                                       | 4                                       |
| Z-578243.TR2 | 13               | 64,4             | 420        | 525    | 112     | 112     | 1,5                                     | 2                                       |
| F-803169.TR2 | 14               | 166              | 440        | 615,95 | 200     | 200     | 3,3                                     | 4,8                                     |
| F-801946.TR2 | 14 <sup>1)</sup> | 182              | 440        | 615,95 | 220     | 220     | 3,3                                     | 4,8                                     |
| F-803717.TR2 | 12               | 138              | 445        | 620    | 160     | 160     | 2                                       | 2                                       |
| Z-578242.TR2 | 13               | 140              | 445        | 620    | 160     | 160     | 2                                       | 2                                       |
| F-801674.TR2 | 13               | 248              | 450        | 680    | 180     | 180     | 2,5                                     | 6                                       |
| Z-578619.TR2 | 13               | 243              | 460        | 702    | 180     | 180     | 2,5                                     | 6                                       |
| Z-580901.TR2 | 13               | 127              | 482        | 620    | 160     | 160     | 2                                       | 5                                       |
| F-801495.TR2 | 12               | 140              | 482        | 640    | 160     | 160     | 2                                       | 2                                       |
| Z-578620.TR2 | 13               | 152              | 540        | 685    | 146     | 146     | 3                                       | 4                                       |

<sup>1)</sup> No retaining slots in the inner ring.

<sup>2)</sup> Outside diameter of seal carriers = 547 mm.

Design 12 Inner ring, outer rings and rollers made from case hardening steel.

Design 13, 14 Inner ring made from case hardening steel.



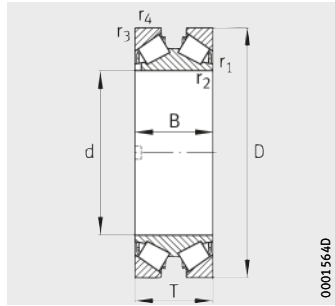
Design 14  
Sealed

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{Or}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     |
| 1 390               | 2 300                   | 0,8                 | 0,84  | 1,25  | 0,82  | 250                |
| 1 440               | 2 600                   | 0,87                | 0,78  | 1,16  | 0,76  | 280                |
| 1 440               | 2 600                   | 0,87                | 0,78  | 1,16  | 0,76  | 280                |
| 1 440               | 2 650                   | 1,05                | 0,64  | 0,96  | 0,63  | 270                |
| 1 040               | 1 930                   | 0,87                | 0,78  | 1,16  | 0,76  | –                  |
| 910                 | 1 970                   | 0,86                | 0,79  | 1,17  | 0,77  | 188                |
| 1 820               | 4 000                   | 0,87                | 0,78  | 1,16  | 0,76  | 400                |
| 1 940               | 4 000                   | 0,87                | 0,78  | 1,16  | 0,76  | 390                |
| 1 990               | 4 250                   | 0,87                | 0,78  | 1,16  | 0,76  | –                  |
| 1 640               | 3 650                   | 0,87                | 0,78  | 1,16  | 0,76  | 360                |
| 1 460               | 3 800                   | 0,87                | 0,78  | 1,16  | 0,76  | 365                |
| 2 060               | 5 300                   | 0,87                | 0,78  | 1,16  | 0,76  | 500                |
| 2 060               | 5 300                   | 0,87                | 0,78  | 1,16  | 0,76  | 500                |
| 2 950               | 6 800                   | 0,87                | 0,78  | 1,16  | 0,76  | 630                |
| 2 060               | 5 300                   | 0,87                | 0,78  | 1,16  | 0,76  | 510                |
| 1 600               | 3 550                   | 0,82                | 0,82  | 1,22  | 0,8   | 335                |
| 2 060               | 5 300                   | 0,87                | 0,78  | 1,16  | 0,76  | 500                |
| 2 440               | 5 600                   | 0,87                | 0,78  | 1,16  | 0,76  | 520                |
| 2 440               | 5 600                   | 0,87                | 0,78  | 1,16  | 0,76  | 520                |
| 3 550               | 7 200                   | 0,87                | 0,78  | 1,16  | 0,76  | 630                |
| 1 160               | 2 850                   | 0,87                | 0,78  | 1,16  | 0,76  | –                  |
| 1 600               | 4 300                   | 0,87                | 0,78  | 1,16  | 0,76  | –                  |
| 1 140               | 3 450                   | 0,7                 | 0,97  | 1,44  | 0,94  | 325                |
| 1 880               | 4 750                   | 0,87                | 0,78  | 1,16  | 0,76  | 430                |
| 2 450               | 5 800                   | 0,87                | 0,78  | 1,16  | 0,76  | 510                |
| 1 880               | 4 750                   | 0,87                | 0,78  | 1,16  | 0,76  | 430                |
| 1 880               | 4 750                   | 0,87                | 0,78  | 1,16  | 0,76  | 430                |
| 2 700               | 6 000                   | 0,87                | 0,78  | 1,16  | 0,76  | 520                |
| 2 650               | 6 100                   | 0,97                | 0,69  | 1,03  | 0,68  | –                  |
| 1 760               | 5 600                   | 0,94                | 0,72  | 1,07  | 0,7   | –                  |
| 2 000               | 6 000                   | 0,87                | 0,78  | 1,16  | 0,76  | –                  |
| 1 960               | 6 000                   | 0,87                | 0,78  | 1,16  | 0,76  | –                  |

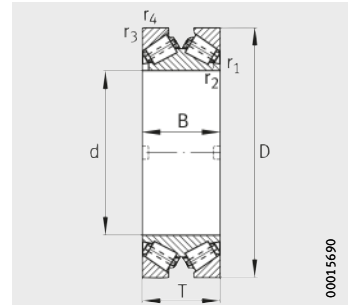


# Tapered roller bearings

Double row,  
X arrangement  
With large contact angle  
Axial bearings  
for oil film bearings



Design 15



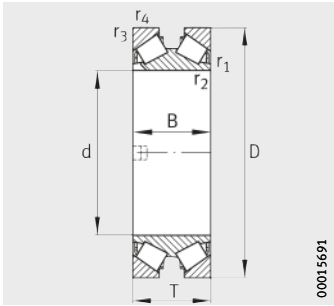
Design 16  
With pin cage

**Dimension table** - Dimensions in mm

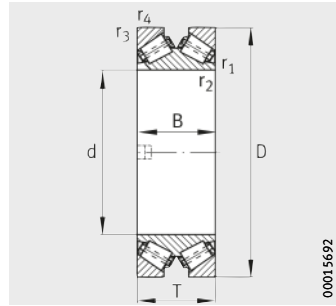
| Designation     | Design           | Mass<br>m<br>≈kg | Dimensions |       |         |         |   |   |
|-----------------|------------------|------------------|------------|-------|---------|---------|---|---|
|                 |                  |                  | d          | D     | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-564447.TR2    | 15               | 19,1             | <b>250</b> | 340   | 76      | 76      | 2,5                                     | 2                                       |
| Z-566446.TR2    | 15               | 17,8             | <b>250</b> | 350   | 67      | 67      | 2,5                                     | 2                                       |
| Z-549122.TR2    | 15               | 21,5             | <b>250</b> | 350   | 76      | 76      | 2,5                                     | 2                                       |
| Z-567453.TR2    | 15               | 57,3             | <b>280</b> | 420   | 130     | 130     | 2,5                                     | 2                                       |
| Z-575386.TR2    | 15               | 28,1             | <b>285</b> | 380   | 92      | 92      | 2,5                                     | 2                                       |
| Z-531529.TR2    | 19               | 49               | <b>300</b> | 440   | 105     | 105     | 4                                       | 4                                       |
| Z-531296.01.TR2 | 19               | 143              | <b>305</b> | 500   | 200     | 200     | 6                                       | 6                                       |
| Z-533062.TR2    | 18 <sup>1)</sup> | 150              | <b>305</b> | 500   | 200     | 200     | 5                                       | 6                                       |
| F-801264.TR2    | 16 <sup>1)</sup> | 190              | <b>305</b> | 560   | 200     | 200     | 6                                       | 12                                      |
| Z-525154.TR2    | 16               | 206              | <b>305</b> | 560   | 200     | 200     | 6                                       | 12                                      |
| Z-575342.TR2    | 17               | 207              | <b>380</b> | 590   | 210     | 210     | 2,5                                     | 5                                       |
| Z-535533.TR2    | 18 <sup>1)</sup> | 270              | <b>400</b> | 650   | 200,025 | 200     | 2,5                                     | 5                                       |
| Z-531295.01.TR2 | 19               | 281              | <b>400</b> | 650   | 240     | 240     | 6                                       | 6                                       |
| F-801317.TR2    | 17               | 135              | <b>445</b> | 620   | 160     | 160     | 2                                       | 5                                       |
| Z-525155.TR2    | 16               | 280              | <b>483</b> | 734   | 200     | 200     | 6,4                                     | 6,4                                     |
| F-807792.TR2    | 17               | 271              | <b>510</b> | 734   | 200,025 | 200,025 | 3,3                                     | 4,8                                     |
| Z-524209.01.TR2 | 17 <sup>2)</sup> | 285              | <b>510</b> | 734   | 200,025 | 200,025 | 3,3                                     | 4,8                                     |
| Z-531530.TR2    | 19               | 484              | <b>510</b> | 800   | 285     | 285     | 7,5                                     | 6                                       |
| Z-531531.02.TR2 | 17               | 684              | <b>635</b> | 940   | 304,8   | 304,8   | 3,3                                     | 6,4                                     |
| Z-524241.TR2    | 15               | 761              | <b>635</b> | 940   | 304,8   | 304,8   | 3,3                                     | 6,4                                     |
| Z-524210.TR2    | 18               | 475              | <b>686</b> | 940   | 228,575 | 235,077 | 3,3                                     | 6,4                                     |
| Z-535959.TR2    | 17 <sup>2)</sup> | 869              | <b>800</b> | 1 100 | 300     | 300     | 1                                       | 6                                       |

1) With sheet steel cages.

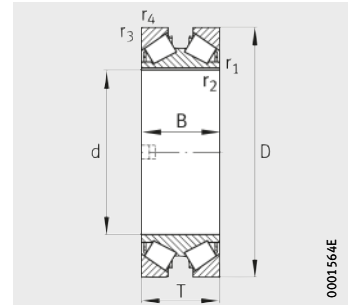
2) With pin cages.



Design 17



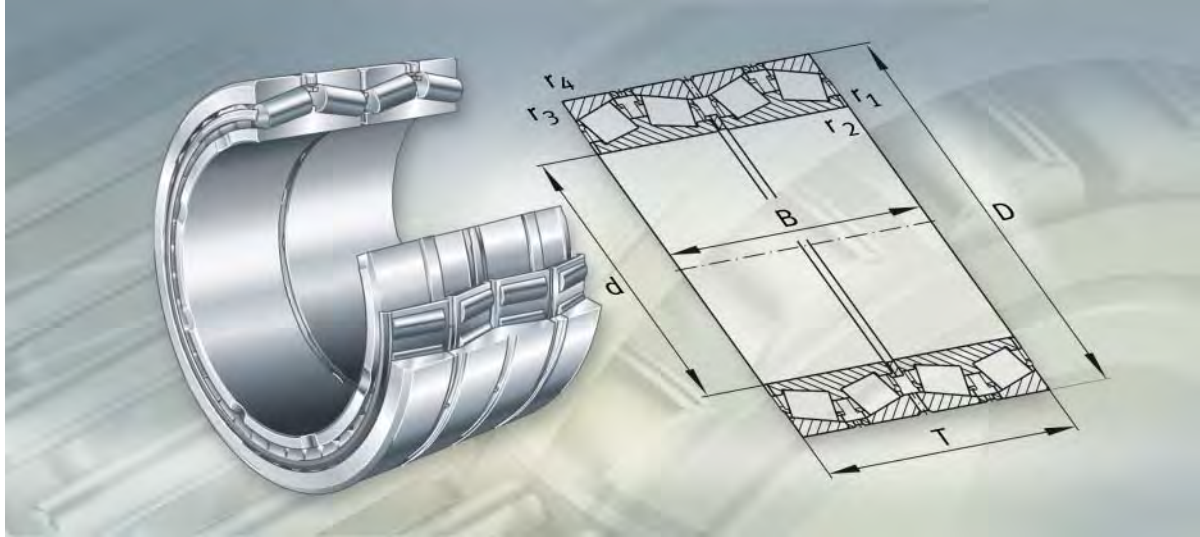
Design 18  
With pin cage



Design 19

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{Or}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     |
| 550                 | 1 210                   | 0,96                | 0,7   | 1,05  | 0,69  | 95                 |
| 425                 | 880                     | 0,94                | 0,72  | 1,07  | 0,7   | 75                 |
| 550                 | 1 210                   | 0,96                | 0,7   | 1,05  | 0,69  | 95                 |
| 1 240               | 2 440                   | 0,79                | 0,85  | 1,27  | 0,83  | 245                |
| 710                 | 1 700                   | 0,94                | 0,72  | 1,07  | 0,7   | 166                |
| 910                 | 1 970                   | 0,86                | 0,79  | 1,17  | 0,77  | 188                |
| 2 280               | 4 700                   | 0,87                | 0,78  | 1,16  | 0,76  | 450                |
| 2 280               | 4 700                   | 0,87                | 0,78  | 1,16  | 0,76  | 450                |
| 2 410               | 4 450                   | 0,87                | 0,78  | 1,16  | 0,76  | 415                |
| 2 600               | 5 000                   | 0,87                | 0,78  | 1,16  | 0,76  | 470                |
| 2 950               | 6 800                   | 0,87                | 0,78  | 1,16  | 0,76  | 630                |
| 2 900               | 6 400                   | 0,87                | 0,78  | 1,16  | 0,76  | 570                |
| 3 550               | 7 200                   | 0,87                | 0,78  | 1,16  | 0,76  | 630                |
| 2 040               | 5 000                   | 0,87                | 0,78  | 1,16  | 0,76  | 455                |
| 3 100               | 6 700                   | 0,99                | 0,68  | 1,01  | 0,67  | 570                |
| 3 100               | 8 200                   | 0,94                | 0,72  | 1,07  | 0,7   | 710                |
| 3 200               | 8 700                   | 0,94                | 0,72  | 1,07  | 0,7   | 750                |
| 5 100               | 11 300                  | 0,87                | 0,78  | 1,16  | 0,76  | 950                |
| 5 900               | 15 600                  | 0,87                | 0,78  | 1,16  | 0,76  | 1 250              |
| 6 200               | 16 500                  | 0,87                | 0,78  | 1,16  | 0,76  | 1 320              |
| 4 600               | 14 000                  | 0,8                 | 0,85  | 1,26  | 0,83  | 1 130              |
| 6 600               | 21 000                  | 0,8                 | 0,85  | 1,26  | 0,83  | 1 610              |





**Four-row tapered roller bearings**

# Four-row tapered roller bearings

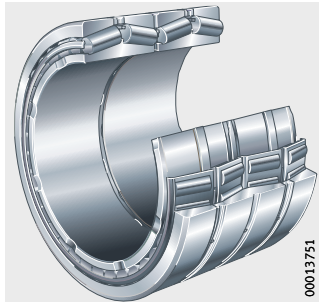
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# Product overview Four-row tapered roller bearings

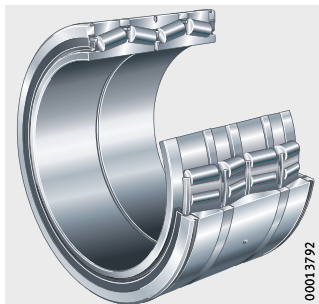
## Metric sizes and inch sizes

Z-5..TR4-01, Z-5..TR4-02,  
F-8..TR4-01, F-8..TR4-02



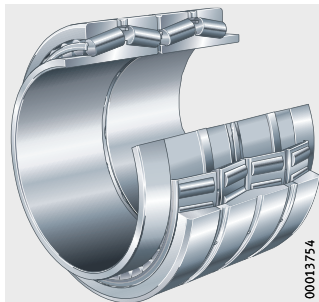
## With integral seals

Z-5..TR4-03, F-8..TR4-03



## With extended inner rings

Z-5..TR4-04, F-8..TR4-04





# Four-row tapered roller bearings

**Features** Four-row tapered roller bearings comprise solid bearing rings and tapered roller and cage assemblies. They are suitable for axial loads in both directions and high radial loads.

The bearings described here are separable. The complete bearing must be mounted in the chock, after which the chock together with the bearing is slid onto the journal. This requires a loose fit for the inner ring on the journal.

For high speeds and loads, however, the inner ring must have a tight fit. This can be achieved by mounting bearings with a tapered bore on tapered roll journals.

Four-row tapered roller bearings are normally supplied with spacer rings between the outer rings while, in a few cases, they do not have intermediate rings.

Four-row tapered roller bearings are used, for example, in bearing arrangements for work rolls (bearings with sheet metal cage) or back-up rolls (bearings with pin cage). In addition to open bearings, sealed designs are also available. They are used to reduce the grease consumption in work roll bearings.

Four-row tapered roller bearings have non-standardised metric or inch dimensions and designations Z-5..TR4 or F-8..TR4. Design variants are indicated by the Technical Specification H122\*\*. These can be requested from Schaeffler.

## Radial and axial load capacity

Four-row tapered roller bearings can support axial forces in both directions as well as high radial forces. Where there are particularly high demands on axial guidance, an additional axial bearing is used in some cases.



# Four-row tapered roller bearings

## Open bearings

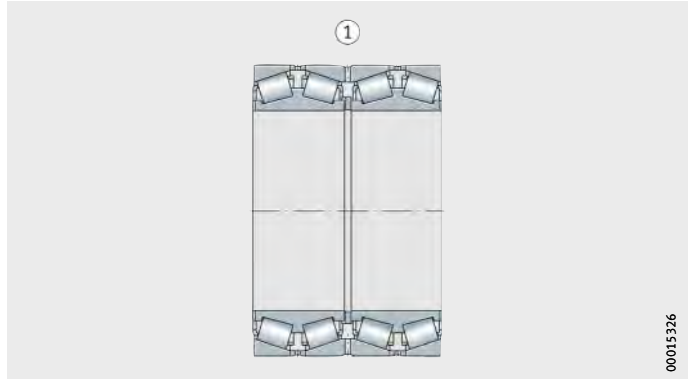
Open four-row tapered roller bearings are available in four designs in metric or inch sizes and tolerances, *Figure 1* and *Figure 2*, page 561.

### Design 1

- The outer ring comprises a double ring and two single rings.
- The inner ring bore is smooth.
- The bearings have sheet metal cages.
- Design 1 is particularly suitable for smaller bearings in work rolls that are subjected to low loads and exhibit little journal wear.

### ① Design 1

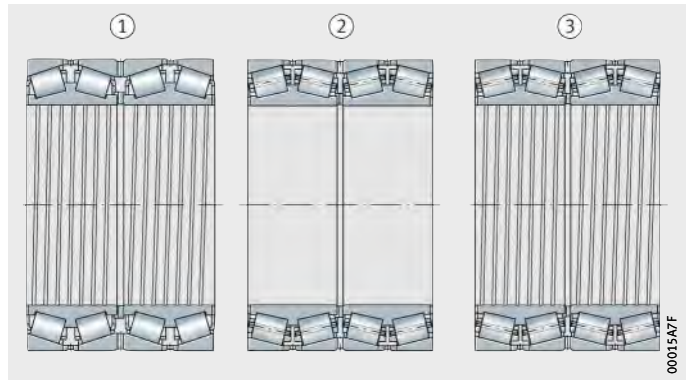
*Figure 1*  
Open four-row tapered roller bearing



- Design 2
  - The outer ring comprises a double ring and two single rings.
  - The helical groove in the inner ring bore is intended to give good lubrication of the fit joint.
  - The bearings have sheet metal cages.
- Design 3
  - The outer ring comprises a double ring and two single rings.
  - The inner ring bore is smooth.
  - Large bearings have through-drilled rollers and pin cages. This is necessary in reversing type stands due to the high inertia forces.
- Design 4
  - The outer ring comprises a double ring and two single rings.
  - The inner ring bore has a helical groove.
  - The bearings have through-drilled rollers and pin cages.

- ① Design 2
- ② Design 3
- ③ Design 4

*Figure 2*  
Open four-row tapered roller bearings



00015A7F



# Four-row tapered roller bearings

## Sealed bearings

Work roll bearing arrangements in hot or cold rolling lines must be effectively sealed against large quantities of water or roll coolant that are mixed with contaminants.

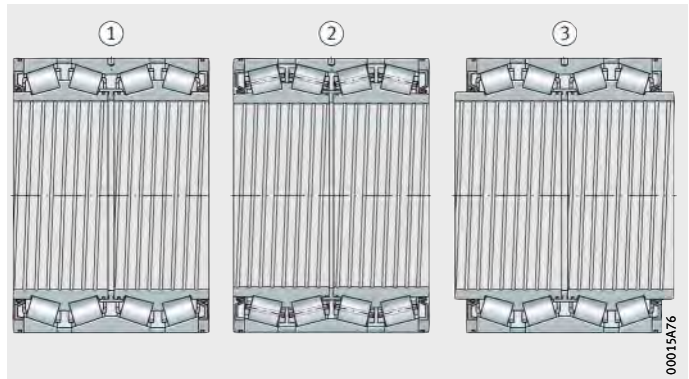
These bearing arrangements are normally lubricated with grease. For cost and environmental reasons, it is desirable to achieve low levels of grease consumption. Four-row tapered roller bearings with integrated seals have therefore been developed, *Figure 3*. These bearings have main dimensions identical to those of the open bearings. Only small quantities of the high quality rolling bearing grease used are required.

Although the basic load ratings of the sealed bearings are lower, they normally have a longer life than the open bearings due to the improved cleanliness in the lubrication gap.

- Design 5
  - The outer ring comprises a double ring and two single rings.
  - The inner ring bore has a helical groove.
  - The bearings have sheet metal cages.
- Design 6
  - The outer ring comprises a double ring and two single rings.
  - The inner ring bore has a helical groove.
  - The bearings have pin cages.
- Design 7
  - The outer ring comprises a double ring and two single rings.
  - The inner rings are laterally extended.
  - The inner ring bore has a helical groove.
  - The bearings have sheet metal cages.

- ① Design 5
- ② Design 6
- ③ Design 7

*Figure 3*  
Sealed four-row tapered roller bearings



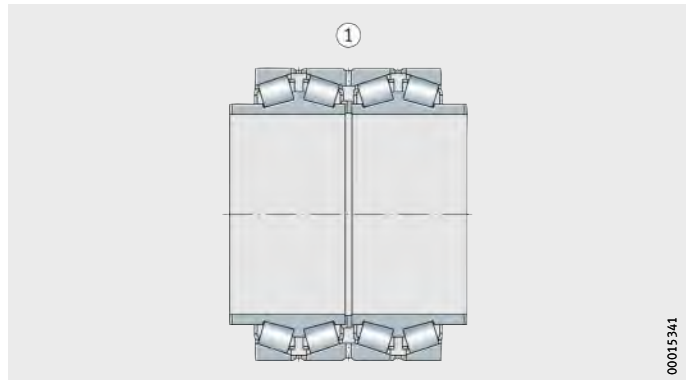
## Bearings with extended inner rings

Design 8

- The outer ring comprises a double ring and two single rings.
- The inner ring bore is smooth.
- The bearings have sheet metal cages.
- The lateral extended sections of the inner ring are ground and designed as sliding surfaces for rotary shaft seals, *Figure 4*.

① Design 8

*Figure 4*  
Four-row tapered roller bearing  
with extended inner rings



00015341

### Operating temperature

Open and sealed four-row tapered roller bearings can be used at operating temperatures from  $-30\text{ °C}$  to  $+150\text{ °C}$ , depending on the lubricant.



The rotary shaft seals on the sealed bearings are made from fluoro elastomer, which can give off gases and vapours harmful to health at approx.  $+300\text{ °C}$  or higher. This may occur, for example, if a welding torch is used in the dismantling of the bearings. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the material.

### Cages

Smaller four-row tapered roller bearings, which are used predominantly in work rolls, are subjected to smaller loads. For these bearings, a sheet steel cage is normally suitable.

Large back-up roll bearings must generally support very high loads. These bearings are fitted with through-drilled rollers and pin cages. Pin cages are necessary in reversing type stands due to the high inertia forces.



# Four-row tapered roller bearings

## Design and safety guidelines

### Equivalent loads

Four-row tapered roller bearings can support radial and axial loads. When determining the equivalent dynamic and static loads, only one row of rollers is considered, in contrast to DIN ISO 281.

### Equivalent dynamic bearing load

The equivalent dynamic load  $P$  is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies (for one row):

### Load ratio and equivalent dynamic load

| Load ratio               | Equivalent dynamic load           |
|--------------------------|-----------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r$                         |
| $\frac{F_a}{F_r} > e$    | $P = 0,4 \cdot F_r + Y \cdot F_a$ |

$P$  kN  
Equivalent dynamic bearing load for combined load  
 $F_a$  kN  
Axial dynamic bearing load  
 $F_r$  kN  
Radial dynamic bearing load  
 $e, Y$  –  
Factors, see dimension tables.

### Equivalent static bearing load

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies (for one row):

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$  kN  
Equivalent static bearing load for combined load  
 $F_{0r}$  kN  
Radial static bearing load  
 $Y_0$  –  
Factor, see dimension tables  
 $F_{0a}$  kN  
Axial static bearing load.

### Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations.  
In continuous operation, a minimum radial load of the order of  $C_r/P > 0,02$  is therefore necessary.

### Comparative load ratings

The basic dynamic load ratings  $C_r$  to DIN ISO 281 are based on a basic rating life of 1 million revolutions. Competitors sometimes give different load ratings that are based on 90 million revolutions (3 000 h at  $500 \text{ min}^{-1}$ ).

Since it is not possible to compare these values with the basic load ratings calculated according to ISO, please contact us regarding the comparative load ratings  $C_{r90}$  and  $C_{a90}$ .

## Design of bearing arrangements

### Shaft tolerances

| Four-row tapered roller bearings  | Nominal dimension<br>d<br>mm | Tolerance <sup>1)</sup><br>mm |
|-----------------------------------|------------------------------|-------------------------------|
| Metric tolerances, with loose fit | < 315                        | -0,180...-0,230               |
|                                   | 315 ...630                   | -0,240...-0,300               |
|                                   | > 630 ...800                 | -0,325...-0,410               |
|                                   | > 800                        | -0,350...-0,450               |
| Inch tolerances, with loose fit   | > 152,4...203,2              | -0,150...-0,175               |
|                                   | > 203,2...304,8              | -0,180...-0,205               |
|                                   | > 304,8...609,6              | -0,200...-0,249               |
|                                   | > 609,6...914,4              | -0,250...-0,334               |
|                                   | > 914,4                      | -0,300...-0,400               |
| Axial bearings                    | d                            | e7                            |

<sup>1)</sup> In the case of high speeds and bearings with a tapered bore, please contact us to discuss the tolerances for the adjacent parts.

### Housing tolerances

| Four-row tapered roller bearings | Nominal dimension<br>D<br>mm | Tolerance <sup>1)</sup><br>mm |
|----------------------------------|------------------------------|-------------------------------|
| Metric tolerances                | ≦ 800                        | H6                            |
|                                  | > 800                        | H7                            |
| Inch tolerances                  | > 304,8... 609,6             | +0,101...+0,150               |
|                                  | > 609,6... 914,4             | +0,156...+0,230               |
|                                  | > 914,4... 1 219,2           | +0,202...+0,300               |
|                                  | > 1 219,6                    | +0,257...+0,380               |

<sup>1)</sup> In the case of high axial forces and bearings with a tapered bore, please contact us to discuss the tolerances for the adjacent parts.



# Four-row tapered roller bearings

## Accuracy

The dimensional and running tolerances of four-row tapered roller bearings are generally defined for individual cases.

Please contact us regarding the values.

Normal tolerances for bearings in metric and inch sizes should be taken from the following tables.

### Normal tolerances for bearings in metric sizes

| Nominal dimension |       | Bore deviation            |      | Outside diameter deviation |      | Width deviation                        |       |
|-------------------|-------|---------------------------|------|----------------------------|------|--|-------|
| mm                |       | $\Delta_{dmp}$<br>$\mu m$ |      | $\Delta_{Dmp}$<br>$\mu m$  |      | $\Delta_{Bs} = \Delta_{Cs}$<br>$\mu m$ |       |
| over              | incl. | max.                      | min. | max.                       | min. | max.                                   | min.  |
| 180               | 250   | 0                         | -30  | 0                          | -30  | 0                                      | -300  |
| 250               | 315   | 0                         | -35  | 0                          | -35  | 0                                      | -350  |
| 315               | 400   | 0                         | -40  | 0                          | -40  | 0                                      | -400  |
| 400               | 500   | 0                         | -45  | 0                          | -45  | 0                                      | -450  |
| 500               | 630   | 0                         | -50  | 0                          | -50  | 0                                      | -500  |
| 630               | 800   | 0                         | -75  | 0                          | -75  | 0                                      | -750  |
| 800               | 1000  | 0                         | -100 | 0                          | -100 | 0                                      | -1000 |
| 1000              | 1250  | 0                         | -125 | 0                          | -125 | 0                                      | -1250 |
| 1250              | 1600  | 0                         | -160 | 0                          | -160 | 0                                      | -1600 |
| 1600              | 2000  | 0                         | -200 | 0                          | -200 | 0                                      | -2000 |

### Normal tolerances for bearings in inch sizes

| Nominal dimension |        | Bore deviation            |      | Outside diameter deviation |      | Width deviation                        |      |
|-------------------|--------|---------------------------|------|----------------------------|------|--|------|
| mm                |        | $\Delta_{dmp}$<br>$\mu m$ |      | $\Delta_{Dmp}$<br>$\mu m$  |      | $\Delta_{Bs} = \Delta_{Cs}$<br>$\mu m$ |      |
| over              | incl.  | max.                      | min. | max.                       | min. | max.                                   | min. |
| 304,8             | 609,6  | +51                       | 0    | +51                        | 0    | $\pm 1524$                             | 0    |
| 609,6             | 914,4  | +76                       | 0    | +76                        | 0    | $\pm 1524$                             | 0    |
| 914,4             | 1219,2 | +102                      | 0    | +102                       | 0    | $\pm 1524$                             | 0    |
| 1219,2            | -      | +127                      | 0    | +127                       | 0    | $\pm 1524$                             | 0    |

## Axial internal clearance

The axial internal clearance of four-row tapered roller bearings differs according to the bearing size and application.

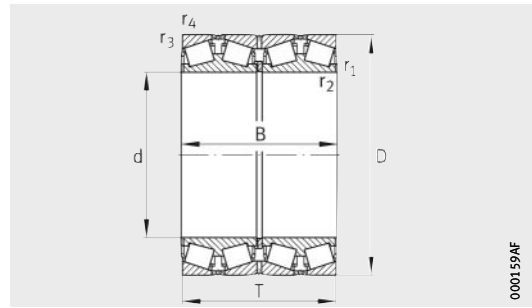
Please contact us for values.





# Tapered roller bearings

Four-row,  
in inch sizes

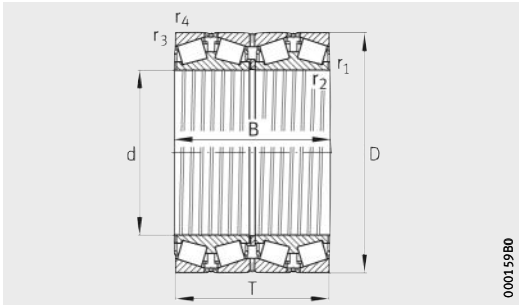


Design 1  
With sheet steel cages

Dimension table - Dimensions in mm

| Designation         | Design | Mass<br>m<br>≈kg | Dimensions     |         |         |         |   |   |
|---------------------|--------|------------------|----------------|---------|---------|---------|---|---|
|                     |        |                  | d              | D       | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-507747.TR4        | 1      | 104              | <b>215,9</b>   | 355,6   | 254     | 254     | 1,6                                     | 1,6                                     |
| F-802100.TR4        | 1      | 84,1             | <b>216,103</b> | 330,2   | 269,875 | 263,525 | 1,5                                     | 3,3                                     |
| Z-511115.TR4        | 1      | 101              | <b>228,6</b>   | 355,6   | 260,35  | 266,7   | 1,5                                     | 1,5                                     |
| Z-524152.TR4        | 1      | 164              | <b>228,6</b>   | 400,05  | 296,875 | 296,875 | 3,3                                     | 3,3                                     |
| Z-564027.TR4        | 1      | 80               | <b>241,224</b> | 355,498 | 288,6   | 228,6   | 1,5                                     | 3,3                                     |
| F-802115.TR4        | 1      | 72               | <b>241,478</b> | 349,148 | 228,6   | 228,6   | 1,5                                     | 3,3                                     |
| F-802194.TR4        | 1      | 45,5             | <b>244,475</b> | 327,025 | 193,675 | 193,675 | 1,5                                     | 3,3                                     |
| F-802194.TR4-H122AA | 2      | 45,5             | <b>244,475</b> | 327,025 | 193,675 | 193,675 | 1,5                                     | 3,3                                     |
| F-802199.TR4        | 1      | 129              | <b>244,475</b> | 381     | 304,8   | 304,8   | 3,3                                     | 4,8                                     |
| F-802252.TR4        | 1      | 84,5             | <b>254</b>     | 358,775 | 269,875 | 269,875 | 1,5                                     | 3,3                                     |
| Z-510375.TR4        | 1      | 115              | <b>260,35</b>  | 400,05  | 253,995 | 255,585 | 1,5                                     | 6,4                                     |
| Z-517254.TR4        | 1      | 180              | <b>260,35</b>  | 422,275 | 317,5   | 314,325 | 6,4                                     | 3,3                                     |
| F-802010.TR4        | 1      | 62,6             | <b>266,7</b>   | 355,6   | 228,6   | 230,188 | 1,5                                     | 3,3                                     |
| F-802010.TR4-H122AA | 2      | 62,6             | <b>266,7</b>   | 355,6   | 228,6   | 230,188 | 1,5                                     | 3,3                                     |
| Z-515700.TR4        | 1      | 116              | <b>266,7</b>   | 393,7   | 269,878 | 269,878 | 3,3                                     | 6,4                                     |
| F-802099.TR4        | 1      | 103              | <b>269,875</b> | 381     | 282,575 | 282,575 | 3,3                                     | 3,3                                     |
| F-802279.TR4        | 1      | 101              | <b>276,225</b> | 393,7   | 269,878 | 269,878 | 1,5                                     | 6,4                                     |
| F-802009.TR4        | 1      | 100              | <b>279,4</b>   | 393,7   | 269,875 | 269,875 | 1,5                                     | 6,4                                     |
| F-802009.TR4-H122AA | 2      | 100              | <b>279,4</b>   | 393,7   | 269,875 | 269,875 | 1,5                                     | 6,4                                     |
| F-802051.TR4        | 1      | 84               | <b>279,578</b> | 380,898 | 244,475 | 244,475 | 1,5                                     | 3,3                                     |
| F-802051.TR4-H122AA | 2      | 84               | <b>279,578</b> | 380,898 | 244,475 | 244,475 | 1,5                                     | 3,3                                     |
| F-802056.TR4        | 1      | 79               | <b>285,75</b>  | 380,898 | 244,475 | 244,475 | 1,5                                     | 3,3                                     |
| F-802056.TR4-H122AA | 2      | 79               | <b>285,75</b>  | 380,898 | 244,475 | 244,475 | 1,5                                     | 3,3                                     |
| F-802228.TR4        | 1      | 121              | <b>288,925</b> | 406,4   | 298,45  | 298,45  | 3,3                                     | 3,3                                     |
| Z-533455.TR4        | 1      | 114              | <b>298,45</b>  | 438,15  | 228,6   | 228,6   | 3,2                                     | 3,2                                     |
| F-802067.TR4        | 1      | 145              | <b>300</b>     | 440     | 279,4   | 280,988 | 3,3                                     | 4,8                                     |
| F-802067.TR4-H122AA | 2      | 145              | <b>300</b>     | 440     | 279,4   | 280,988 | 3,3                                     | 3,3                                     |
| F-802136.TR4        | 1      | 137              | <b>300,038</b> | 422,275 | 311,15  | 311,15  | 3,3                                     | 3,3                                     |
| Z-511861.TR4        | 1      | 115              | <b>304,8</b>   | 419,1   | 269,875 | 269,875 | 1,5                                     | 6,4                                     |
| Z-575220.TR4        | 1      | 271              | <b>304,8</b>   | 495,3   | 349,25  | 342,9   | 3,3                                     | 6,4                                     |
| F-802024.TR4        | 1      | 103              | <b>304,902</b> | 412,648 | 266,7   | 266,7   | 3,3                                     | 3,3                                     |
| F-802024.TR4-H122AA | 2      | 103              | <b>304,902</b> | 412,648 | 266,7   | 266,7   | 3,3                                     | 3,3                                     |
| Z-518078.TR4        | 1      | 131              | <b>305,003</b> | 438,048 | 279,4   | 280,99  | 3,3                                     | 4,8                                     |

1) The comparative designations were taken from documents available to us.  
They give information on identical main dimensions and chamfer dimensions only.  
The cage and bearing designs are not always identical.  
Furthermore, the table makes no claims to completeness.



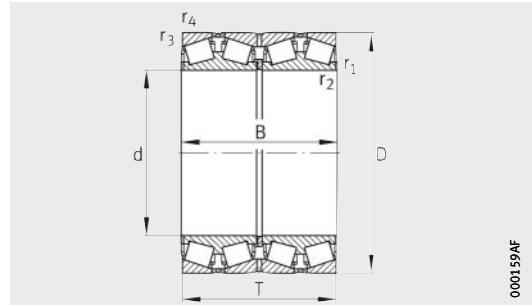
Design 2  
With sheet steel cages

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load | Interchange designation <sup>1)</sup> |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|---------------------------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     | TQO types                             |
| 3 050               | 5 400                   | 0,34                | 1,96  | 2,91  | 1,91  | 580                | 130850DW.400.401D                     |
| 2 750               | 5 200                   | 0,56                | 1,21  | 1,81  | 1,19  | 570                | 9974DW.9920.9920D                     |
| 2 900               | 5 000                   | 0,34                | 1,96  | 2,91  | 1,91  | 540                | EE130904DW.400.402D                   |
| 4 150               | 6 400                   | 0,31                | 2,18  | 3,25  | 2,13  | 670                | EE529091DW.157.158D                   |
| 2 400               | 4 500                   | 0,35                | 1,92  | 2,86  | 1,88  | –                  | EE127094DW.138.139D                   |
| 2 400               | 4 500                   | 0,35                | 1,92  | 2,86  | 1,88  | 490                | EE127097DW.135.136D                   |
| 1 590               | 3 400                   | 0,48                | 1,41  | 2,1   | 1,38  | 370                | LM247748DW.710.710D                   |
| 1 590               | 3 400                   | 0,48                | 1,41  | 2,1   | 1,38  | 370                | LM247748DW.710.710D                   |
| 3 750               | 6 950                   | 0,46                | 1,46  | 2,17  | 1,43  | –                  | EE126096DW.150.151D                   |
| 3 200               | 6 300                   | 0,34                | 1,98  | 2,95  | 1,94  | –                  | M249749DW.710.710D                    |
| 2 850               | 5 000                   | 0,44                | 1,53  | 2,28  | 1,5   | 530                | EE221027DW.575.576D                   |
| 4 350               | 7 100                   | 0,33                | 2,02  | 3     | 1,97  | 720                | HM252349DW.310.310D                   |
| 2 550               | 5 400                   | 0,36                | 1,9   | 2,83  | 1,86  | 580                | LM451349DW.310.310D                   |
| 2 550               | 5 400                   | 0,36                | 1,9   | 2,83  | 1,86  | 580                | LM451349DGW.310.310D                  |
| 3 200               | 6 000                   | 0,45                | 1,49  | 2,21  | 1,45  | –                  | EE275106DW.155.156D                   |
| 3 600               | 7 400                   | 0,33                | 2,03  | 3,02  | 1,99  | 780                | M252349DW.310.310D                    |
| 3 200               | 6 000                   | 0,45                | 1,49  | 2,21  | 1,45  | –                  | EE275109DW.155.156D                   |
| 3 550               | 6 800                   | 0,38                | 1,78  | 2,65  | 1,74  | 700                | EE135111DW.155.156D                   |
| 3 550               | 6 800                   | 0,38                | 1,78  | 2,65  | 1,74  | 700                | EE135111DGW.155.156D                  |
| 2 600               | 6 100                   | 0,42                | 1,6   | 2,39  | 1,57  | 650                | LM654644DW.610.610D                   |
| 2 600               | 6 100                   | 0,42                | 1,6   | 2,39  | 1,57  | 650                | LM654644DGW.610.610D                  |
| 2 600               | 6 100                   | 0,42                | 1,6   | 2,39  | 1,57  | 650                | LM654648DW.610.610D                   |
| 2 600               | 6 100                   | 0,42                | 1,6   | 2,39  | 1,57  | 650                | LM654648DGW.610.610D                  |
| 4 050               | 8 200                   | 0,35                | 1,94  | 2,89  | 1,9   | 860                | M255449DW.410.410D                    |
| 3 000               | 5 500                   | 0,37                | 1,81  | 2,7   | 1,77  | –                  | –                                     |
| 3 150               | 6 400                   | 0,4                 | 1,69  | 2,52  | 1,65  | 650                | EE129119DW.174.175D                   |
| 3 150               | 6 400                   | 0,4                 | 1,69  | 2,52  | 1,65  | 650                | EE129119DGW.174.175D                  |
| 4 150               | 8 700                   | 0,36                | 1,86  | 2,77  | 1,82  | 900                | HM256849DW.810.810D                   |
| 3 650               | 7 650                   | 0,32                | 2,12  | 3,15  | 2,07  | –                  | M257149DW.110.110D                    |
| 5 500               | 9 300                   | 0,4                 | 1,69  | 2,52  | 1,65  | 900                | EE724121DW.195.196D                   |
| 3 650               | 7 700                   | 0,32                | 2,12  | 3,15  | 2,07  | 790                | M257248DW.210.210D                    |
| 3 650               | 7 700                   | 0,32                | 2,12  | 3,15  | 2,07  | 790                | M257248DGW.210.210D                   |
| 3 900               | 7 200                   | 0,47                | 1,43  | 2,12  | 1,4   | 720                | M757449DW.410.410D                    |



# Tapered roller bearings

Four-row,  
in inch sizes

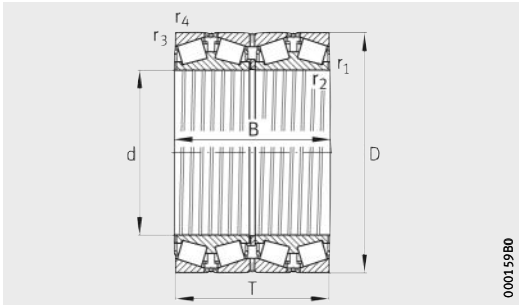


Design 1  
With sheet steel cages

Dimension table (continued) · Dimensions in mm

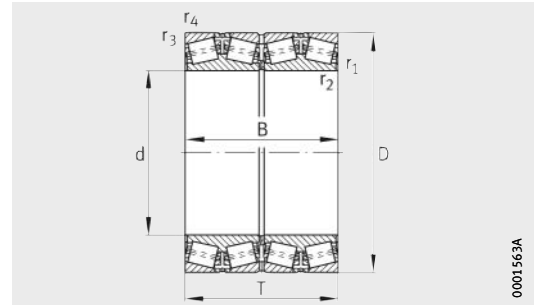
| Designation                  | Design | Mass<br>m<br>≈kg | Dimensions     |         |         |         |                    |                    |
|------------------------------|--------|------------------|----------------|---------|---------|---------|--------------------|--------------------|
|                              |        |                  | d              | D       | T       | B       | $r_1, r_2$<br>min. | $r_3, r_4$<br>min. |
| F-802045.TR4                 | 1      | 103              | <b>317,5</b>   | 422,275 | 269,875 | 269,875 | 1,5                | 3,3                |
| F-802045.TR4-H122AA          | 2      | 103              | <b>317,5</b>   | 422,275 | 269,875 | 269,875 | 1,5                | 3,3                |
| Z-531883.TR4                 | 1      | 136              | <b>330,2</b>   | 444,5   | 301,625 | 301,625 | 3,3                | 3,3                |
| Z-531281.TR4                 | 1      | 144              | <b>330,2</b>   | 482,6   | 222,25  | 212,725 | 1,6                | 6,4                |
| F-802287.TR4-H122AA          | 2      | 100              | <b>330,302</b> | 438,023 | 254     | 247,65  | 1,5                | 3,3                |
| F-802062.TR4                 | 1      | 187              | <b>333,375</b> | 469,9   | 342,9   | 342,9   | 3,3                | 3,3                |
| F-802062.TR4-M               | 3      | 193              | <b>333,375</b> | 469,9   | 342,9   | 342,9   | 3,3                | 3,3                |
| Z-539439.TR4                 | 1      | 236              | <b>342,9</b>   | 533,4   | 301,625 | 307,985 | 3,3                | 3,3                |
| Z-572452.TR4                 | 3      | 369              | <b>342,9</b>   | 571,5   | 342,9   | 342,9   | 3,3                | 6,4                |
| F-802002.TR4-A370-400        | 1      | 110              | <b>343,052</b> | 457,098 | 254     | 254     | 1,5                | 3,3                |
| F-802002.TR4-H122AA-A370-400 | 2      | 110              | <b>343,052</b> | 457,098 | 254     | 254     | 1,5                | 3,3                |
| F-802028.TR4                 | 1      | 215              | <b>346,075</b> | 488,95  | 358,775 | 358,775 | 3,3                | 3,3                |
| F-802052.TR4                 | 1      | 140              | <b>347,662</b> | 469,9   | 292,1   | 292,1   | 3,3                | 3,3                |
| F-802119.TR4                 | 1      | 104              | <b>355,6</b>   | 457,2   | 252,412 | 252,412 | 1,5                | 3,3                |
| F-802022.TR4                 | 1      | 143              | <b>355,6</b>   | 482,6   | 269,875 | 265,112 | 1,5                | 3,3                |
| F-802022.TR4-H122AA          | 2      | 142              | <b>355,6</b>   | 482,6   | 269,875 | 265,112 | 1,5                | 3,3                |
| F-802137.TR4-H122AA          | 2      | 179              | <b>355,6</b>   | 488,95  | 317,5   | 317,5   | 1,5                | 3,3                |
| Z-548757.TR4                 | 1      | 272              | <b>368,3</b>   | 523,875 | 382,588 | 382,588 | 3,3                | 6,4                |
| F-802177.TR4                 | 1      | 135              | <b>374,65</b>  | 501,65  | 260,35  | 250,825 | 1,5                | 3,3                |
| F-802251.TR4                 | 1      | 306              | <b>384,175</b> | 546,1   | 400,05  | 400,05  | 3,3                | 6,4                |
| F-802014.TR4                 | 1      | 183              | <b>385,762</b> | 514,35  | 317,5   | 317,5   | 3,3                | 3,3                |
| F-802014.TR4-H122AA          | 2      | 183              | <b>385,762</b> | 514,35  | 317,5   | 317,5   | 3,3                | 3,3                |
| Z-508328.02.TR4              | 1      | 192              | <b>406,4</b>   | 546,1   | 288,925 | 268,288 | 1,5                | 6,4                |
| F-802104.TR4-H122AA          | 2      | 183              | <b>406,4</b>   | 546,1   | 288,925 | 288,925 | 1,5                | 6,4                |
| F-802104.TR4                 | 1      | 183              | <b>406,4</b>   | 546,1   | 288,925 | 288,925 | 1,5                | 6,4                |
| F-802086.TR4                 | 1      | 290              | <b>406,4</b>   | 565,15  | 381     | 381     | 3,3                | 6,4                |
| F-802086.TR4-H122AA          | 2      | 290              | <b>406,4</b>   | 565,15  | 381     | 381     | 3,3                | 6,4                |
| Z-511569.TR4                 | 1      | 367              | <b>406,4</b>   | 590,55  | 400,05  | 400,05  | 3,3                | 6,4                |
| Z-517944.TR4                 | 3      | 378              | <b>406,4</b>   | 590,55  | 400,05  | 400,05  | 3,3                | 6,4                |
| F-802047.TR4                 | 1      | 218              | <b>409,575</b> | 546,1   | 334,962 | 334,962 | 1,5                | 6,4                |
| F-802047.TR4-H122AA          | 2      | 218              | <b>409,575</b> | 546,1   | 334,962 | 334,962 | 1,5                | 6,4                |
| F-802047.TR4-M               | 3      | 225              | <b>409,575</b> | 546,1   | 334,962 | 334,962 | 1,5                | 6,4                |

1) The comparative designations were taken from documents available to us.  
They give information on identical main dimensions and chamfer dimensions only.  
The cage and bearing designs are not always identical.  
Furthermore, the table makes no claims to completeness.



00015980

Design 2  
With sheet steel cages



0001563A

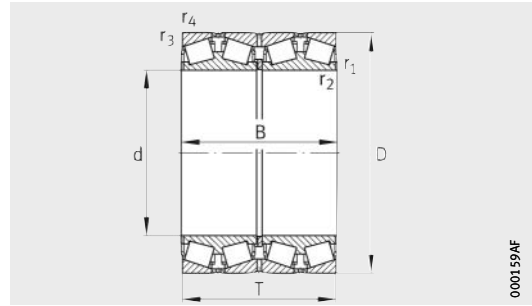
Design 3  
With pin cages

| Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    | Interchange designation <sup>1)</sup> |
|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|---------------------------------------|
| dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN | TQO types                             |
| 3 500                        | 7 800                          | 0,32                | 2,12           | 3,15           | 2,07           | 800                   | LM258648DW.610.610D                   |
| 3 500                        | 7 800                          | 0,32                | 2,12           | 3,15           | 2,07           | 800                   | LM258648DGW.610.610D                  |
| 3 800                        | 8 500                          | 0,4                 | 1,69           | 2,52           | 1,65           | 850                   | M260149DW.110.110D                    |
| 2 900                        | 5 600                          | 0,41                | 1,65           | 2,45           | 1,61           | 540                   | 161301D.900.901D                      |
| 3 250                        | 6 700                          | 0,44                | 1,54           | 2,29           | 1,5            | 670                   | EE138131DW.172.173D                   |
| 4 950                        | 10 700                         | 0,38                | 1,79           | 2,67           | 1,75           | 1 070                 | HM261049DW.010.010D                   |
| 5 000                        | 11 000                         | 0,38                | 1,79           | 2,67           | 1,75           | 1 100                 | HM261049DW.010.010D                   |
| 4 950                        | 8 000                          | 0,33                | 2,03           | 3,02           | 1,98           | 740                   | 971355DW.972100.972103D               |
| 6 550                        | 10 600                         | 0,33                | 2,03           | 3,02           | 1,98           | –                     | EE536136DW.225.226D                   |
| 3 250                        | 6 700                          | 0,47                | 1,43           | 2,12           | 1,4            | –                     | LM761649DW.610.610D                   |
| 3 250                        | 6 700                          | 0,47                | 1,43           | 2,12           | 1,4            | –                     | LM761649DGW.610.610D                  |
| 5 800                        | 12 600                         | 0,33                | 2,03           | 3,02           | 1,98           | 1 230                 | HM262749DW.710.710D                   |
| 4 200                        | 8 700                          | 0,31                | 2,16           | 3,22           | 2,12           | 860                   | M262449DW.410.410D                    |
| 3 450                        | 8 100                          | 0,32                | 2,12           | 3,15           | 2,07           | 810                   | LM263149DW.110.110D                   |
| 3 550                        | 7 900                          | 0,45                | 1,51           | 2,25           | 1,48           | 770                   | LM763449DW.410.410D                   |
| 3 550                        | 7 900                          | 0,45                | 1,51           | 2,25           | 1,48           | 770                   | LM763449DGW.410.410D                  |
| 4 900                        | 10 800                         | 0,39                | 1,71           | 2,54           | 1,67           | 1 060                 | M263349DGW.310.310D                   |
| 6 400                        | 13 700                         | 0,35                | 1,92           | 2,86           | 1,88           | 1 320                 | HM265049DW.010.010D                   |
| 3 750                        | 7 600                          | 0,47                | 1,43           | 2,12           | 1,4            | 730                   | LM765149DW.110.110D                   |
| 7 100                        | 15 800                         | 0,33                | 2,03           | 3,02           | 1,98           | 1 510                 | HM266449DW.410.410D                   |
| 4 600                        | 10 700                         | 0,45                | 1,5            | 2,23           | 1,47           | 1 040                 | LM665949DW.910.910D                   |
| 4 600                        | 10 700                         | 0,45                | 1,5            | 2,23           | 1,47           | 1 040                 | LM665949DGW.910.910D                  |
| 4 150                        | 8 500                          | 0,47                | 1,43           | 2,12           | 1,4            | 780                   | EE234161DW.215.216D                   |
| 4 400                        | 9 300                          | 0,43                | 1,56           | 2,33           | 1,53           | –                     | LM767749DGW.710.710D                  |
| 4 450                        | 9 300                          | 0,43                | 1,56           | 2,33           | 1,53           | 870                   | LM767749DW.710.710D                   |
| 6 900                        | 15 000                         | 0,43                | 1,57           | 2,34           | 1,53           | 1 410                 | M267949DW.910.910D                    |
| 6 900                        | 15 000                         | 0,43                | 1,57           | 2,34           | 1,53           | 1 410                 | M267949DGW.910.910D                   |
| 7 350                        | 15 000                         | 0,34                | 1,99           | 2,96           | 1,94           | –                     | EE833161DW.232.233D                   |
| 7 700                        | 16 100                         | 0,34                | 1,99           | 2,96           | 1,94           | 1 490                 | EE833161DW.232.233D                   |
| 5 300                        | 12 400                         | 0,45                | 1,5            | 2,24           | 1,47           | 1 190                 | M667947DW.910.910D                    |
| 5 300                        | 12 400                         | 0,45                | 1,5            | 2,24           | 1,47           | 1 190                 | M667947DGW.910.910D                   |
| 5 500                        | 13 000                         | 0,45                | 1,5            | 2,24           | 1,47           | 1 240                 | M667947DW.910.910D                    |



# Tapered roller bearings

Four-row,  
in inch sizes

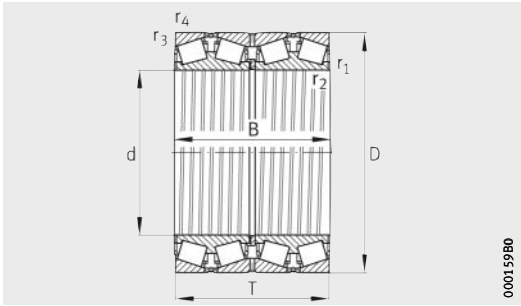


Design 1  
With sheet steel cages

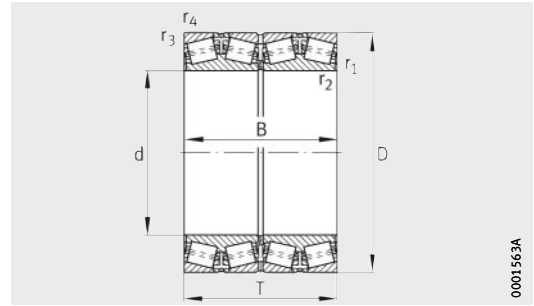
Dimension table (continued) · Dimensions in mm

| Designation           | Design | Mass<br>m<br>≈kg | Dimensions     |         |         |         |   |   |
|-----------------------|--------|------------------|----------------|---------|---------|---------|---|---|
|                       |        |                  | d              | D       | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| F-802048.TR4-H122AA   | 2      | 376              | <b>415,925</b> | 590,55  | 434,975 | 434,975 | 3,3                                     | 6,4                                     |
| F-802048.TR4-M        | 3      | 402              | <b>415,925</b> | 590,55  | 434,975 | 434,975 | 3,3                                     | 6,4                                     |
| F-802155.TR4          | 1      | 185              | <b>431,8</b>   | 571,5   | 279,4   | 279,4   | 1,5                                     | 3,3                                     |
| F-802012.TR4          | 1      | 236              | <b>431,8</b>   | 571,5   | 336,55  | 336,55  | 1,5                                     | 6,4                                     |
| F-802012.TR4-H122BP   | 2      | 236              | <b>431,8</b>   | 571,5   | 336,55  | 336,55  | 1,5                                     | 6,4                                     |
| F-802012.TR4-M        | 3      | 246              | <b>431,8</b>   | 571,5   | 336,55  | 336,55  | 1,5                                     | 6,4                                     |
| Z-530985.TR4          | 1      | 385              | <b>431,8</b>   | 635     | 355,6   | 355,6   | 6,4                                     | 6,4                                     |
| Z-530731.TR4          | 3      | 396              | <b>431,8</b>   | 635     | 355,6   | 355,6   | 6,4                                     | 6,4                                     |
| F-802209.TR4-H122AC   | 1      | 279              | <b>432,003</b> | 609,524 | 317,5   | 317,5   | 3,6                                     | 6,4                                     |
| F-802179.TR4-H122AA   | 2      | 461              | <b>447,675</b> | 635     | 463,55  | 463,55  | 3,3                                     | 6,4                                     |
| F-802179.TR4-M-H122AD | 3      | 477              | <b>447,675</b> | 635     | 463,55  | 463,55  | 3,3                                     | 6,4                                     |
| F-802098.TR4          | 1      | 197              | <b>457,2</b>   | 596,9   | 279,4   | 276,225 | 1,5                                     | 3,3                                     |
| F-802098.TR4-M        | 3      | 205              | <b>457,2</b>   | 596,9   | 279,4   | 276,225 | 1,5                                     | 3,3                                     |
| Z-506201.TR4          | 1      | 574              | <b>479,425</b> | 679,45  | 495,3   | 495,3   | 3,3                                     | 6,4                                     |
| Z-561038.TR4          | 3      | 576              | <b>479,425</b> | 679,45  | 495,3   | 495,3   | 3,3                                     | 6,4                                     |
| F-802006.TR4-H122AB   | 1      | 244              | <b>482,6</b>   | 615,95  | 330,2   | 330,2   | 6,4                                     | 6,4                                     |
| F-802006.TR4-H122BA   | 2      | 244              | <b>482,6</b>   | 615,95  | 330,2   | 330,2   | 6,4                                     | 6,4                                     |
| Z-561772.TR4          | 1      | 358              | <b>482,6</b>   | 635     | 421     | 421     | 3                                       | 6,4                                     |
| F-802237.TR4          | 1      | 384              | <b>482,6</b>   | 647,7   | 417,512 | 417,512 | 3,3                                     | 6,4                                     |
| F-802122.TR4          | 1      | 348              | <b>488,95</b>  | 660,4   | 361,95  | 365,125 | 8                                       | 6,4                                     |
| Z-518570.03.TR4       | 2      | 256              | <b>489,026</b> | 634,873 | 320,675 | 320,675 | 3,3                                     | 3,3                                     |
| F-802037.TR4          | 1      | 253              | <b>489,026</b> | 634,873 | 320,675 | 320,675 | 3,3                                     | 3,3                                     |
| F-802037.TR4-H122BB   | 2      | 253              | <b>489,026</b> | 634,873 | 320,675 | 320,675 | 3,3                                     | 3,3                                     |
| F-802085.TR4-H122AC   | 1      | 385              | <b>501,65</b>  | 673,1   | 387,35  | 400,05  | 3,3                                     | 6,4                                     |
| F-802085.TR4-M        | 3      | 400              | <b>501,65</b>  | 673,1   | 387,35  | 400,05  | 3,3                                     | 6,4                                     |
| F-802195.TR4          | 1      | 656              | <b>501,65</b>  | 711,2   | 520,7   | 520,7   | 3,3                                     | 6,4                                     |
| F-802195.TR4-H122CP   | 2      | 656              | <b>501,65</b>  | 711,2   | 520,7   | 520,7   | 4,6                                     | 6,4                                     |
| F-802195.TR4-M        | 3      | 680              | <b>501,65</b>  | 711,2   | 520,7   | 520,7   | 3,3                                     | 6,4                                     |
| F-802053.TR4          | 1      | 710              | <b>508</b>     | 762     | 463,55  | 463,55  | 6,4                                     | 6,4                                     |
| F-802053.TR4-M        | 3      | 762              | <b>508</b>     | 762     | 463,55  | 463,55  | 6,4                                     | 6,4                                     |
| F-802030.TR4          | 1      | 394              | <b>514,35</b>  | 673,1   | 422,275 | 422,275 | 3,3                                     | 6,4                                     |
| F-802030.TR4-H122AA   | 2      | 393              | <b>514,35</b>  | 673,1   | 422,275 | 422,275 | 3,3                                     | 6,4                                     |
| F-802030.TR4-M        | 3      | 395              | <b>514,35</b>  | 673,1   | 422,275 | 422,275 | 3,3                                     | 6,4                                     |

1) The comparative designations were taken from documents available to us.  
They give information on identical main dimensions and chamfer dimensions only.  
The cage and bearing designs are not always identical.  
Furthermore, the table makes no claims to completeness.



Design 2  
With sheet steel cages



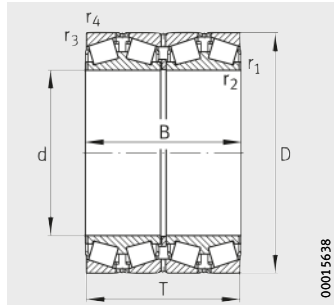
Design 3  
With pin cages

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load | Interchange designation <sup>1)</sup> |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|---------------------------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     | TQO types                             |
| 7 900               | 16 700                  | 0,34                | 1,98  | 2,94  | 1,93  | 1 540              | M268749DGW.710.710D                   |
| 8 200               | 17 700                  | 0,34                | 1,98  | 2,94  | 1,93  | 1 640              | M268749DW.710.710D                    |
| 4 650               | 9 600                   | 0,55                | 1,24  | 1,84  | 1,21  | 890                | LM869449DW.410.410D                   |
| 5 800               | 13 500                  | 0,44                | 1,54  | 2,29  | 1,5   | 1 260              | LM769349DW.310.310D                   |
| 5 800               | 13 500                  | 0,44                | 1,54  | 2,29  | 1,5   | 1 260              | LM769349DGW.310.310D                  |
| 5 900               | 13 800                  | 0,44                | 1,54  | 2,29  | 1,5   | 1 290              | LM769349DW.310.310D                   |
| 7 300               | 13 100                  | 0,32                | 2,12  | 3,15  | 2,07  | 1 170              | EE931170DW.250.251D                   |
| 7 500               | 13 600                  | 0,32                | 2,12  | 3,15  | 2,07  | 1 210              | EE931170DW.250.251D                   |
| 5 700               | 10 800                  | 0,47                | 1,44  | 2,15  | 1,41  | –                  | EE736173DW.238.239D                   |
| 9 800               | 20 800                  | 0,33                | 2,07  | 3,09  | 2,03  | –                  | M270749DW.710.710D                    |
| 10 000              | 21 200                  | 0,33                | 2,07  | 3,09  | 2,03  | –                  | M270749DW.710.710D                    |
| 4 700               | 10 100                  | 0,47                | 1,43  | 2,12  | 1,4   | 910                | L770847DW.810.810D                    |
| 4 750               | 10 300                  | 0,47                | 1,43  | 2,12  | 1,4   | 930                | L770847DW.810.810D                    |
| 10 200              | 22 500                  | 0,35                | 1,92  | 2,86  | 1,88  | 2 010              | M272749DW.710.710D                    |
| 10 700              | 23 900                  | 0,35                | 1,92  | 2,86  | 1,88  | 2 130              | M272749DW.710.710D                    |
| 5 400               | 14 000                  | 0,37                | 1,83  | 2,72  | 1,79  | 1 280              | LM272248DW.210.210D                   |
| 5 400               | 14 000                  | 0,37                | 1,83  | 2,72  | 1,79  | 1 280              | LM272248DGW.210.210D                  |
| 7 700               | 19 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 1 730              | M272449DW.410.410D                    |
| 7 800               | 18 400                  | 0,31                | 2,18  | 3,24  | 2,13  | 1 670              | M272647DW.610.610D                    |
| 6 000               | 13 700                  | 0,45                | 1,5   | 2,23  | 1,46  | –                  | EE640193DW.260.261D                   |
| 5 600               | 12 800                  | 0,47                | 1,43  | 2,12  | 1,4   | 1 150              | LM772749DGW.710.710D                  |
| 5 800               | 13 400                  | 0,47                | 1,43  | 2,12  | 1,4   | 1 210              | LM772749DW.710.710D                   |
| 5 800               | 13 400                  | 0,47                | 1,43  | 2,12  | 1,4   | 1 210              | LM772749DGW.710.710D                  |
| 8 000               | 18 200                  | 0,32                | 2,12  | 3,15  | 2,07  | 1 600              | EE641198DW.265.266D                   |
| 8 100               | 18 600                  | 0,32                | 2,12  | 3,15  | 2,07  | 1 640              | EE641198DW.265.266D                   |
| 11 400              | 25 500                  | 0,35                | 1,92  | 2,86  | 1,88  | –                  | M274149DW.110.110D                    |
| 11 400              | 25 500                  | 0,35                | 1,92  | 2,86  | 1,88  | –                  | Timken series: M274100                |
| 11 600              | 26 000                  | 0,35                | 1,92  | 2,86  | 1,88  | –                  | M274149DW.110.110D                    |
| 10 500              | 20 300                  | 0,39                | 1,73  | 2,58  | 1,69  | 1 730              | EE531201DW.300.301D                   |
| 11 000              | 21 700                  | 0,39                | 1,73  | 2,58  | 1,69  | 1 850              | EE531201DW.300.301D                   |
| 8 200               | 19 800                  | 0,33                | 2,07  | 3,09  | 2,03  | 1 770              | LM274449DW.410.410D                   |
| 8 200               | 19 800                  | 0,33                | 2,07  | 3,09  | 2,03  | 1 770              | LM274449DGW.410.410D                  |
| 8 300               | 20 300                  | 0,33                | 2,07  | 3,09  | 2,03  | 1 810              | LM274449DW.410.410D                   |

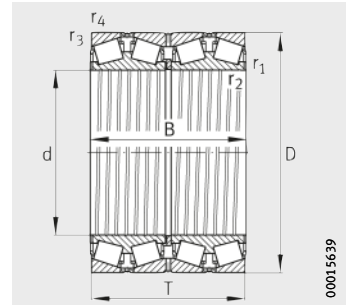


# Tapered roller bearings

Four-row,  
in inch sizes



Design 1  
With sheet steel cages



Design 2  
With sheet steel cages

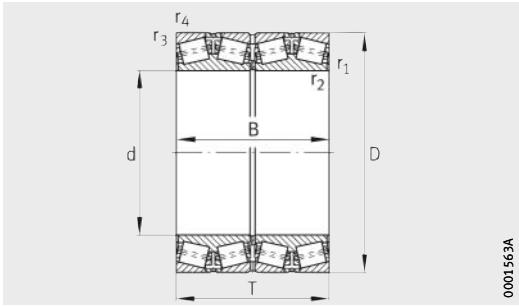
Dimension table (continued) · Dimensions in mm

| Designation           | Design          | Mass<br>m<br>≈ kg | Dimensions     |         |         |         |   | Chamfer radii                           |  |
|-----------------------|-----------------|-------------------|----------------|---------|---------|---------|---|---|--|
|                       |                 |                   | d              | D       | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |  |
| F-802148.TR4-H122BD   | 1               | 734               | <b>519,112</b> | 736,6   | 536,575 | 536,575 | 3,3                                     | 6,4                                     |  |
| F-802210.TR4          | 1               | 451               | <b>520,7</b>   | 711,2   | 400,05  | 400,05  | 3,3                                     | 6,4                                     |  |
| F-802038.TR4          | 1               | 800               | <b>536,575</b> | 761,873 | 558,8   | 558,8   | 3,3                                     | 6,4                                     |  |
| F-802038.TR4-M        | 3               | 836               | <b>536,575</b> | 761,873 | 558,8   | 558,8   | 3,3                                     | 6,4                                     |  |
| F-802102.TR4          | 1               | 363               | <b>558,8</b>   | 736,6   | 322,268 | 322,265 | 3,3                                     | 6,4                                     |  |
| F-802102.TR4-M        | 3               | 376               | <b>558,8</b>   | 736,6   | 322,268 | 322,265 | 3,3                                     | 6,4                                     |  |
| F-802093.TR4          | 1               | 466               | <b>558,8</b>   | 736,6   | 409,575 | 409,575 | 3,3                                     | 6,4                                     |  |
| F-802093.TR4-M        | 3               | 486               | <b>558,8</b>   | 736,6   | 409,575 | 409,575 | 3,3                                     | 6,4                                     |  |
| Z-521179.TR4          | 1 <sup>1)</sup> | 530               | <b>558,8</b>   | 736,6   | 457,2   | 455,612 | 3,3                                     | 6,4                                     |  |
| F-802049.TR4          | 1               | 974               | <b>571,5</b>   | 812,8   | 593,725 | 593,725 | 3,3                                     | 6,4                                     |  |
| F-802049.TR4-M        | 3               | 1 030             | <b>571,5</b>   | 812,8   | 593,725 | 593,725 | 3,3                                     | 6,4                                     |  |
| F-802090.TR4          | 1               | 470               | <b>584,2</b>   | 762     | 401,638 | 396,875 | 3,3                                     | 6,4                                     |  |
| F-802090.TR4-M        | 3               | 483               | <b>584,2</b>   | 762     | 401,638 | 396,875 | 3,3                                     | 6,4                                     |  |
| Z-535868.TR4          | 1               | 1 500             | <b>584,2</b>   | 901,7   | 539,747 | 584,2   | 3,2                                     | 9,7                                     |  |
| F-802198.TR4-H122AA   | 2               | 589               | <b>585,788</b> | 771,525 | 479,425 | 479,425 | 3,3                                     | 6,4                                     |  |
| F-802198.TR4-M        | 3               | 610               | <b>585,788</b> | 771,525 | 479,425 | 479,425 | 3,3                                     | 6,4                                     |  |
| F-802185.TR4          | 1               | 1 090             | <b>595,312</b> | 844,55  | 615,95  | 615,95  | 3,3                                     | 6,4                                     |  |
| F-802185.TR4-M        | 3               | 1 160             | <b>595,312</b> | 844,55  | 615,95  | 615,95  | 3,3                                     | 6,4                                     |  |
| F-802075.TR4          | 1               | 1 130             | <b>603,25</b>  | 857,25  | 622,3   | 622,3   | 3,3                                     | 6,4                                     |  |
| F-802075.TR4-M-H122AA | 4               | 1 200             | <b>603,25</b>  | 857,25  | 622,3   | 622,3   | 3,3                                     | 6,4                                     |  |
| F-802054.TR4-M-H122AB | 3               | 463               | <b>609,6</b>   | 787,4   | 361,95  | 361,95  | 3,3                                     | 6,4                                     |  |
| F-802054.TR4-M-H122AP | 3               | 463               | <b>609,6</b>   | 787,4   | 361,95  | 361,95  | 6,4                                     | 6,4                                     |  |
| Z-529150.TR4          | 4               | 710               | <b>609,6</b>   | 813,562 | 479,425 | 479,425 | 6,4                                     | 3,3                                     |  |
| Z-530986.TR4          | 3               | 1 270             | <b>609,6</b>   | 863,6   | 660,4   | 660,4   | 3,3                                     | 6,4                                     |  |
| Z-513141.TR4          | 3               | 1 360             | <b>635</b>     | 901,7   | 654,05  | 654,05  | 3,3                                     | 6,4                                     |  |
| F-802147.TR4-M        | 3               | 901               | <b>646,112</b> | 857,25  | 542,925 | 542,925 | 3,3                                     | 6,4                                     |  |
| F-802183.TR4-M        | 3               | 1 840             | <b>647,7</b>   | 1 028,7 | 565,15  | 558,8   | 11,2                                    | 6,4                                     |  |
| F-802057.TR4-M-H122AA | 4               | 1 450             | <b>650</b>     | 915     | 674     | 674     | 3,6                                     | 6,1                                     |  |
| F-802057.TR4-M-H122AB | 1               | 462               | <b>660</b>     | 855     | 319,192 | 318,48  | 4,8                                     | 9,7                                     |  |
| F-802203.TR4-H122AA   | 2               | 398               | <b>660,4</b>   | 812,8   | 365,125 | 365,125 | 3,3                                     | 6,4                                     |  |
| F-802203.TR4-M-H122AA | 4               | 412               | <b>660,4</b>   | 812,8   | 365,125 | 365,125 | 3,3                                     | 6,4                                     |  |
| Z-515672.TR4          | 3               | 2 210             | <b>660,4</b>   | 1 066,8 | 647,703 | 638,175 | 6,4                                     | 6,4                                     |  |

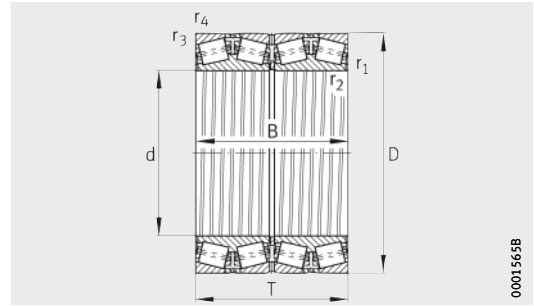
<sup>1)</sup> Bearing with lubrication holes through the central rib of the inner ring.

<sup>2)</sup> The comparative designations were taken from documents available to us.  
They give information on identical main dimensions and chamfer dimensions only.  
The cage and bearing designs are not always identical.  
Furthermore, the table makes no claims to completeness.





Design 3  
With pin cages



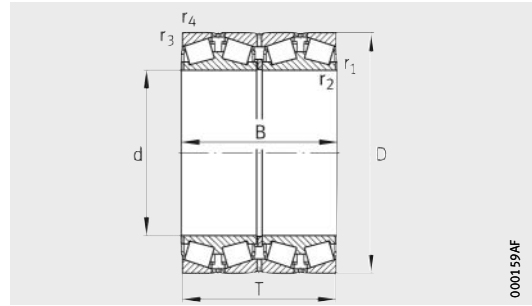
Design 4  
With pin cages

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load | Interchange designation <sup>2)</sup> |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|---------------------------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{Or}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     | TQO types                             |
| 11 800              | 27 000                  | 0,33                | 2,04  | 3,04  | 2     | –                  | M275349DW.310.310D                    |
| 8 500               | 18 300                  | 0,43                | 1,57  | 2,34  | 1,53  | 1 580              | LM275349DW.310.310D                   |
| 13 800              | 30 000                  | 0,3                 | 2,28  | 3,39  | 2,23  | 2 600              | M276449DW.410.410D                    |
| 14 200              | 31 000                  | 0,3                 | 2,28  | 3,39  | 2,23  | 2 650              | M276449DW.410.410D                    |
| 6 900               | 15 300                  | 0,34                | 1,98  | 2,94  | 1,93  | 1 290              | EE843221DW.290.291D                   |
| 7 000               | 15 600                  | 0,34                | 1,98  | 2,94  | 1,93  | 1 320              | EE843221DW.290.291D                   |
| 9 100               | 21 900                  | 0,35                | 1,95  | 2,9   | 1,91  | 1 880              | LM377449DW.410.410D                   |
| 9 200               | 22 400                  | 0,35                | 1,95  | 2,9   | 1,91  | 1 920              | LM377449DW.410.410D                   |
| 10 000              | 24 500                  | 0,32                | 2,14  | 3,18  | 2,09  | –                  | LM277149DA.110.110D                   |
| 15 400              | 34 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 2 900              | M278749DW.710.710D                    |
| 16 100              | 36 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 3 050              | M278749DW.710.710D                    |
| 8 400               | 20 600                  | 0,35                | 1,91  | 2,85  | 1,87  | 1 760              | LM778549DW.510.510D                   |
| 8 600               | 21 500                  | 0,35                | 1,91  | 2,85  | 1,87  | 1 830              | LM778549DW.510.510D                   |
| 14 900              | 27 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 2 120              | 665231DW.355.356D                     |
| 10 200              | 25 500                  | 0,33                | 2,03  | 3,02  | 1,98  | 2 160              | LM278849DW.810.810D                   |
| 10 200              | 25 500                  | 0,33                | 2,03  | 3,02  | 1,98  | 2 140              | LM278849DW.810.810D                   |
| 16 400              | 37 000                  | 0,34                | 1,99  | 2,96  | 1,95  | 3 100              | M280049DW.010.010D                    |
| 17 200              | 39 500                  | 0,34                | 1,99  | 2,96  | 1,95  | 3 300              | M280049DW.010.010D                    |
| 16 700              | 38 500                  | 0,35                | 1,95  | 2,9   | 1,91  | 3 200              | M280249DW.M210.210D                   |
| 17 500              | 40 500                  | 0,35                | 1,95  | 2,9   | 1,91  | 3 400              | M280249DGW.210.210D                   |
| 7 400               | 18 800                  | 0,5                 | 1,35  | 2,01  | 1,32  | 1 590              | 649241DW.310.311D                     |
| 7 400               | 18 800                  | 0,5                 | 1,35  | 2,01  | 1,32  | 1 590              | 649242DW.310.311D                     |
| 12 400              | 29 500                  | 0,26                | 2,55  | 3,8   | 2,5   | 2 470              | LM280249DGW.210.210D                  |
| 18 100              | 42 500                  | 0,35                | 1,95  | 2,9   | 1,91  | 3 500              | M280349DW.310.310D                    |
| 18 600              | 44 000                  | 0,33                | 2,03  | 3,02  | 1,98  | –                  | M281049DW.010.010D                    |
| 14 500              | 35 500                  | 0,33                | 2,03  | 3,02  | 1,98  | 2 950              | LM281049DW.010.010D                   |
| 18 000              | 32 500                  | 0,31                | 2,16  | 3,22  | 2,12  | –                  | EE424257DW.405.407D                   |
| 18 700              | 45 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 3 650              | M281349DGW.310.310D                   |
| 7 650               | 17 600                  | 0,35                | 1,91  | 2,84  | 1,87  | –                  | EE749259DW.334.335D                   |
| 8 200               | 21 400                  | 0,33                | 2,03  | 3,02  | 1,98  | 1 780              | L281149DGW.110.110D                   |
| 8 400               | 22 200                  | 0,33                | 2,03  | 3,02  | 1,98  | 1 850              | L281149DGW.110.110D                   |
| 23 100              | 42 500                  | 0,31                | 2,15  | 3,2   | 2,1   | 3 200              | 428262DW.420.420XD                    |



# Tapered roller bearings

Four-row,  
in inch sizes

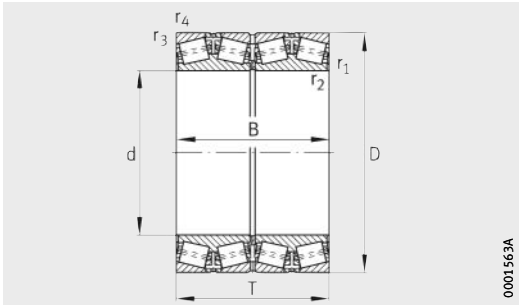


Design 1  
With sheet steel cages

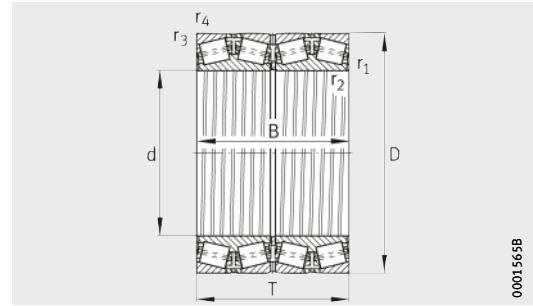
Dimension table (continued) · Dimensions in mm

| Designation             | Design | Mass<br>m<br>≈kg | Dimensions      |          |         |         |   |   |
|-------------------------|--------|------------------|-----------------|----------|---------|---------|---|---|
|                         |        |                  | d               | D        | T       | B       | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-568422.TR4            | 3      | 995              | <b>679,45</b>   | 901,7    | 552,45  | 552,45  | 3,3                                     | 6,4                                     |
| Z-521612.TR4            | 1      | 970              | <b>679,45</b>   | 901,7    | 552,45  | 679,45  | 3,2                                     | 6,4                                     |
| F-802040.TR4            | 1      | 523              | <b>685,8</b>    | 876,3    | 355,6   | 352,425 | 3,3                                     | 6,4                                     |
| F-802040.TR4-M          | 3      | 542              | <b>685,8</b>    | 876,3    | 355,6   | 352,425 | 3,3                                     | 6,4                                     |
| F-802170.TR4-M          | 3      | 1070             | <b>708,025</b>  | 930,275  | 565,15  | 565,15  | 3,3                                     | 6,4                                     |
| F-802055.TR4            | 1      | 518              | <b>711,2</b>    | 914,4    | 317,5   | 317,5   | 3,3                                     | 6,4                                     |
| F-802055.TR4-M          | 3      | 542              | <b>711,2</b>    | 914,4    | 317,5   | 317,5   | 3,3                                     | 6,4                                     |
| F-802173.TR4-M-H122AB   | 3      | 1910             | <b>714,375</b>  | 1016     | 704,85  | 704,85  | 3,3                                     | 6,4                                     |
| F-802103.TR4-M          | 3      | 1120             | <b>717,55</b>   | 946,15   | 565,15  | 565,15  | 3,3                                     | 6,4                                     |
| F-802103.TR4-M-H122AA   | 4      | 1120             | <b>717,55</b>   | 946,15   | 565,15  | 565,15  | 3,3                                     | 6,4                                     |
| F-802182.TR4-M-H122AA   | 4      | 2060             | <b>730,25</b>   | 1035,05  | 755,65  | 755,65  | 3,3                                     | 6,4                                     |
| Z-526837.TR4            | 1      | 1270             | <b>749,3</b>    | 990,6    | 605     | 605     | 3,3                                     | 6,4                                     |
| Z-527082.TR4            | 3      | 1300             | <b>749,3</b>    | 990,6    | 605     | 605     | 3,3                                     | 6,4                                     |
| Z-513140.TR4            | 3      | 2190             | <b>749,3</b>    | 1066,8   | 736,6   | 723,9   | 4,8                                     | 12,7                                    |
| F-802032.TR4-M          | 3      | 2130             | <b>762</b>      | 1066,8   | 736,6   | 723,9   | 7,9                                     | 12,7                                    |
| Z-532879.TR4            | 3      | 3110             | <b>774,7</b>    | 1220     | 838,474 | 774,7   | 6,4                                     | 12,7                                    |
| Z-526416.TR4            | 3      | 3530             | <b>780</b>      | 1220     | 838,474 | 838,474 | 6,4                                     | 12,7                                    |
| F-802110.TR4-M-H122AA   | 4      | 2590             | <b>812,8</b>    | 1143     | 768,35  | 768,35  | 6,4                                     | 12,7                                    |
| F-802234.TR4-M          | 3      | 2990             | <b>825,5</b>    | 1168,4   | 844,55  | 844,55  | 4,8                                     | 12,7                                    |
| Z-514432.TR4            | 3      | 3110             | <b>825,5</b>    | 1193,8   | 812,8   | 812,8   | 6,4                                     | 12,7                                    |
| Z-528337.TR4            | 3      | 1360             | <b>863,6</b>    | 1090     | 669,925 | 669,925 | 4,8                                     | 12,7                                    |
| F-802204.TR4-M-A300-350 | 3      | 1870             | <b>863,6</b>    | 1130,3   | 669,925 | 669,925 | 4,8                                     | 12,7                                    |
| Z-561585.TR4            | 3      | 2170             | <b>863,6</b>    | 1181,1   | 666,75  | 666,75  | 4,8                                     | 12,7                                    |
| F-802247.TR4-M-H122AD   | 3      | 3400             | <b>863,6</b>    | 1219,2   | 889     | 876,3   | 4,8                                     | 12,7                                    |
| Z-521592.TR4            | 3      | 4080             | <b>901,7</b>    | 1295,4   | 914,4   | 901,7   | 4,8                                     | 12,7                                    |
| F-802139.TR4-M          | 3      | 3170             | <b>938,212</b>  | 1270     | 825,5   | 825,5   | 4,8                                     | 12,7                                    |
| Z-511781.TR4            | 3      | 4390             | <b>939,8</b>    | 1333,5   | 952,5   | 952,5   | 4,8                                     | 12,7                                    |
| Z-539519.TR4            | 3      | 2600             | <b>1006,475</b> | 1295,4   | 764     | 764     | 4,8                                     | 12,7                                    |
| F-802027.TR4-M          | 3      | 4690             | <b>1139,825</b> | 1509,712 | 923,925 | 923,925 | 4,8                                     | 12,7                                    |
| Z-523207.TR4            | 3      | 5770             | <b>1200,15</b>  | 1593,85  | 990,6   | 990,6   | 4,8                                     | 12,7                                    |
| F-801326.TR4            | 4      | 6920             | <b>1346,2</b>   | 1729,74  | 1143    | 1143    | 4,8                                     | 12,7                                    |

1) The comparative designations were taken from documents available to us.  
They give information on identical main dimensions and chamfer dimensions only.  
The cage and bearing designs are not always identical.  
Furthermore, the table makes no claims to completeness.



Design 3  
With pin cages



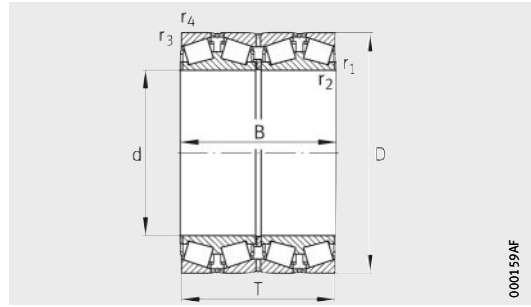
Design 4  
With pin cages

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load | Interchange designation <sup>1)</sup> |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|---------------------------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{Or}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     | TQO types                             |
| 13 800              | 35 000                  | 0,33                | 2,07  | 3,09  | 2,03  | 2 850              | LM281849DW.810.810D                   |
| 13 100              | 32 500                  | 0,33                | 2,07  | 3,09  | 2,03  | 2 650              | LM281849DW.810.810D                   |
| 7 800               | 19 900                  | 0,41                | 1,66  | 2,47  | 1,62  | 1 620              | EE655271DW.345.346D                   |
| 8 200               | 21 000                  | 0,41                | 1,66  | 2,47  | 1,62  | 1 710              | EE655271DW.345.346D                   |
| 15 800              | 41 000                  | 0,33                | 2,06  | 3,07  | 2,02  | 3 300              | LM282549DW.510.510D                   |
| 7 900               | 19 000                  | 0,38                | 1,77  | 2,63  | 1,73  | 1 500              | EE755281DW.360.361D                   |
| 8 000               | 19 400                  | 0,38                | 1,77  | 2,63  | 1,73  | 1 530              | EE755281DW.360.361D                   |
| 23 200              | 53 000                  | 0,32                | 2,08  | 3,09  | 2,03  | –                  | M383240DW.210.210D                    |
| 15 700              | 41 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 3 300              | LM282847DW.810.810D                   |
| 15 700              | 41 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 3 300              | LM282847DGW.810.810D                  |
| 23 600              | 54 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 4 200              | M283449DGW.410.410D                   |
| 16 600              | 43 500                  | 0,34                | 2,01  | 2,99  | 1,97  | 3 450              | LM283649DW.610.610D                   |
| 17 400              | 46 500                  | 0,34                | 2,01  | 2,99  | 1,97  | 3 700              | LM283649DW.610.610D                   |
| 24 600              | 57 000                  | 0,34                | 1,98  | 2,95  | 1,94  | 4 400              | EE325296DW.420.421D                   |
| 24 200              | 59 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 4 500              | M284148DW.111.110D                    |
| 31 500              | 70 000                  | 0,39                | 1,72  | 2,56  | 1,68  | 5 200              | EE631305D.484.483XD                   |
| 30 000              | 67 000                  | 0,39                | 1,72  | 2,56  | 1,68  | –                  | EE631307D.484.483XD                   |
| 26 500              | 65 000                  | 0,37                | 1,83  | 2,72  | 1,79  | 4 900              | –                                     |
| 29 500              | 72 000                  | 0,34                | 2     | 2,98  | 1,96  | 5 500              | M285848DW.810.810D                    |
| 31 000              | 69 000                  | 0,39                | 1,72  | 2,56  | 1,68  | 5 100              | EE631325DW.470.470D                   |
| 19 200              | 58 000                  | 0,26                | 2,55  | 3,8   | 2,5   | 4 450              | –                                     |
| 22 400              | 60 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 4 200              | LM286249DW.210.210D                   |
| 22 800              | 58 500                  | 0,38                | 1,76  | 2,62  | 1,72  | –                  | LM286449DW.410.410D                   |
| 32 000              | 77 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 5 800              | EE547341DW.480.481D                   |
| 36 500              | 84 000                  | 0,32                | 2,12  | 3,15  | 2,07  | 6 100              | EE634356D.510.510D                    |
| 32 000              | 82 000                  | 0,32                | 2,12  | 3,15  | 2,07  | 6 000              | LM287649DW.610.610D                   |
| 38 000              | 93 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 6 800              | LM287849DW.810.810D                   |
| 28 000              | 80 000                  | 0,33                | 2,03  | 3,02  | 1,98  | 5 800              | LM288249DW.210.210D                   |
| 38 000              | 105 000                 | 0,32                | 2,09  | 3,11  | 2,04  | 7 300              | SKF BT4B 331334/HA4                   |
| 46 500              | 129 000                 | 0,33                | 2,06  | 3,06  | 2,01  | –                  | LM288949D.910.910D                    |
| 49 000              | 146 000                 | 0,33                | 2,03  | 3,02  | 1,98  | –                  | –                                     |



# Tapered roller bearings

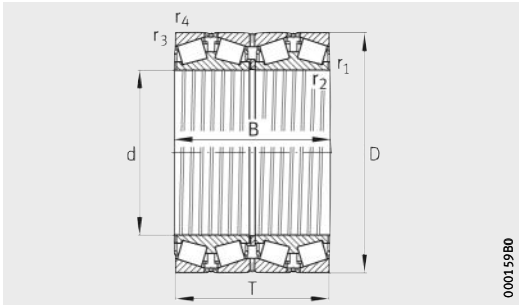
Four-row,  
in metric sizes



Design 1  
With sheet steel cages

Dimension table - Dimensions in mm

| Designation     | Design | Mass<br>m<br>≈kg | Dimensions |     |     |       |   |   |
|-----------------|--------|------------------|------------|-----|-----|-------|---|---|
|                 |        |                  | d          | D   | T   | B     | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-533136.TR4    | 1      | 72,1             | <b>190</b> | 320 | 232 | 232   | 1                                       | 4                                       |
| Z-512055.TR4    | 1      | 54               | <b>205</b> | 320 | 205 | 205   | 4                                       | 4                                       |
| Z-567972.TR4    | 1      | 55               | <b>220</b> | 320 | 200 | 200   | 1,5                                     | 4                                       |
| Z-532027.TR4    | 1      | 75               | <b>220</b> | 340 | 218 | 220   | 1,5                                     | 4                                       |
| F-802105.TR4    | 1      | 100              | <b>220</b> | 340 | 305 | 305   | 4                                       | 3                                       |
| F-802184.TR4    | 1      | 70               | <b>240</b> | 338 | 248 | 248   | 4                                       | 3                                       |
| Z-532028.TR4    | 1      | 81               | <b>240</b> | 360 | 218 | 218   | 1                                       | 3                                       |
| Z-534751.TR4    | 1      | 150              | <b>240</b> | 410 | 270 | 270   | 4                                       | 4                                       |
| Z-508990.01.TR4 | 1      | 104              | <b>245</b> | 380 | 254 | 255,5 | 1                                       | 3                                       |
| F-802200.TR4    | 1      | 88               | <b>260</b> | 368 | 268 | 268   | 5                                       | 5                                       |
| Z-522614.TR4    | 1      | 79               | <b>260</b> | 380 | 200 | 200   | 2                                       | 5                                       |
| Z-531025.TR4    | 1      | 119              | <b>260</b> | 400 | 250 | 250   | 5                                       | 5                                       |
| Z-534480.TR4    | 1      | 163              | <b>260</b> | 400 | 345 | 345   | 5                                       | 5                                       |
| F-802151.TR4    | 1      | 178              | <b>260</b> | 440 | 300 | 300   | 3                                       | 6                                       |
| Z-574281.TR4    | 1      | 115              | <b>280</b> | 395 | 288 | 288   | 5                                       | 5                                       |
| Z-548651.TR4    | 1      | 113              | <b>280</b> | 420 | 224 | 224   | 4                                       | 4                                       |
| Z-532029.TR4    | 1      | 105              | <b>280</b> | 420 | 250 | 250   | 2                                       | 5                                       |
| F-802132.TR4    | 1      | 167              | <b>280</b> | 420 | 345 | 345   | 5                                       | 5                                       |
| Z-510039.TR4    | 1      | 197              | <b>280</b> | 460 | 324 | 324   | 6                                       | 6                                       |
| Z-574613.TR4    | 1      | 156              | <b>300</b> | 460 | 248 | 248   | 5                                       | 4                                       |
| F-802245.TR4    | 1      | 233              | <b>300</b> | 460 | 390 | 390   | 5                                       | 5                                       |
| Z-534753.TR4    | 1      | 280              | <b>300</b> | 500 | 350 | 350   | 6                                       | 5                                       |
| Z-576008.TR4    | 1      | 141              | <b>310</b> | 430 | 310 | 310   | 4                                       | 4                                       |
| Z-566230.TR4    | 1      | 153              | <b>320</b> | 440 | 335 | 335   | 2                                       | 5                                       |
| F-802232.TR4    | 1      | 248              | <b>340</b> | 520 | 325 | 325   | 6                                       | 5                                       |
| Z-534754.TR4    | 1      | 485              | <b>350</b> | 590 | 420 | 420   | 3                                       | 6                                       |
| Z-523453.TR4    | 2      | 183              | <b>355</b> | 490 | 316 | 316   | 1,5                                     | 2,5                                     |
| Z-530758.TR4    | 1      | 260              | <b>360</b> | 510 | 380 | 380   | 1,5                                     | 5                                       |
| Z-572344.TR4    | 1      | 267              | <b>360</b> | 520 | 370 | 370   | 3                                       | 4                                       |
| Z-514166.TR4    | 1      | 270              | <b>360</b> | 540 | 325 | 325   | 6                                       | 6                                       |
| Z-546304.TR4    | 1      | 282              | <b>360</b> | 540 | 340 | 340   | 4                                       | 5                                       |



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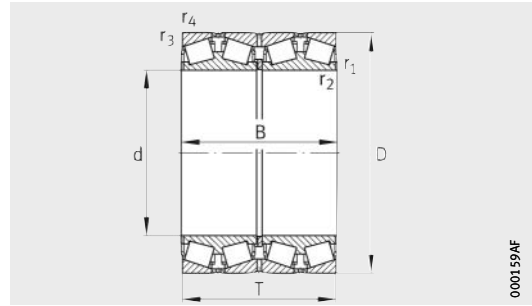
**Design 2**  
With sheet steel cages

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     |
| 2 400               | 3 400                   | 0,45                | 1,5   | 2,23  | 1,5   | –                  |
| 2 000               | 3 200                   | 0,43                | 1,56  | 2,32  | 1,5   | –                  |
| 2 000               | 3 400                   | 0,34                | 2     | 2,98  | 2     | –                  |
| 2 470               | 4 000                   | 0,45                | 1,51  | 2,25  | 1,5   | 430                |
| 3 600               | 6 400                   | 0,35                | 1,95  | 2,9   | 1,9   | 700                |
| 2 550               | 5 300                   | 0,38                | 1,79  | 2,66  | 1,8   | 580                |
| 2 600               | 4 300                   | 0,43                | 1,55  | 2,31  | 1,5   | 455                |
| 3 900               | 5 900                   | 0,29                | 2,32  | 3,45  | 2,3   | 600                |
| 2 850               | 4 950                   | 0,42                | 1,61  | 2,4   | 1,6   | 520                |
| 3 100               | 6 100                   | 0,35                | 1,93  | 2,88  | 1,9   | –                  |
| 2 450               | 4 150                   | 0,32                | 2,13  | 3,17  | 2,1   | 430                |
| 2 850               | 5 000                   | 0,44                | 1,53  | 2,28  | 1,5   | –                  |
| 4 600               | 8 600                   | 0,43                | 1,55  | 2,31  | 1,5   | 900                |
| 3 800               | 5 850                   | 0,7                 | 0,97  | 1,44  | 0,9   | –                  |
| 3 700               | 7 300                   | 0,35                | 1,95  | 2,9   | 1,9   | 770                |
| 3 100               | 5 300                   | 0,37                | 1,8   | 2,69  | 1,8   | –                  |
| 3 200               | 6 200                   | 0,47                | 1,42  | 2,12  | 1,4   | 640                |
| 4 800               | 9 150                   | 0,46                | 1,47  | 2,19  | 1,4   | –                  |
| 4 900               | 7 900                   | 0,34                | 1,99  | 2,96  | 1,9   | 770                |
| 3 450               | 5 800                   | 0,46                | 1,46  | 2,18  | 1,4   | 570                |
| 6 300               | 12 000                  | 0,32                | 2,12  | 3,15  | 2,1   | 1 210              |
| 5 300               | 9 500                   | 0,58                | 1,16  | 1,72  | 1,1   | –                  |
| 4 300               | 9 150                   | 0,32                | 2,12  | 3,15  | 2,1   | –                  |
| 4 850               | 10 300                  | 0,33                | 2,03  | 3,02  | 2     | 1 050              |
| 5 800               | 10 500                  | 0,29                | 2,32  | 3,45  | 2,3   | 1 000              |
| 7 200               | 11 800                  | 0,7                 | 0,97  | 1,44  | 0,9   | –                  |
| 4 900               | 10 800                  | 0,39                | 1,71  | 2,54  | 1,7   | 1 060              |
| 5 900               | 12 100                  | 0,34                | 1,96  | 2,93  | 1,9   | 1 180              |
| 6 200               | 13 100                  | 0,35                | 1,92  | 2,86  | 1,9   | 1 270              |
| 5 500               | 9 700                   | 0,41                | 1,65  | 2,46  | 1,6   | 900                |
| 6 000               | 11 100                  | 0,4                 | 1,68  | 2,5   | 1,6   | 1 040              |



# Tapered roller bearings

Four-row,  
in metric sizes

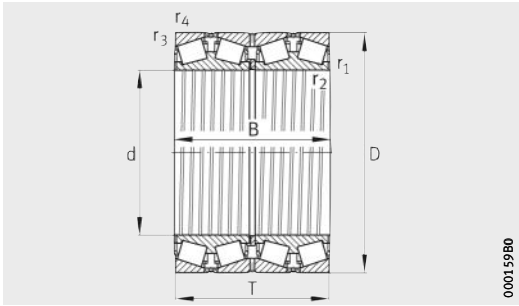


Design 1  
With sheet steel cages

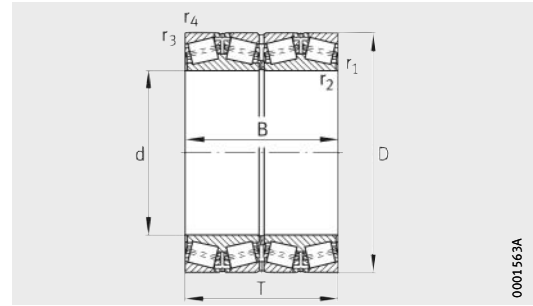
Dimension table (continued) · Dimensions in mm

| Designation         | Design          | Mass<br>m<br>≈kg | Dimensions |     |       |       |   |   |
|---------------------|-----------------|------------------|------------|-----|-------|-------|---|---|
|                     |                 |                  | d          | D   | T     | B     | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| Z-565625.TR4        | 1               | 282              | <b>380</b> | 560 | 325   | 325   | 2,5                                     | 6                                       |
| F-802109.TR4        | 1               | 296              | <b>380</b> | 560 | 360   | 360   | 1,5                                     | 5                                       |
| F-802109.TR4-M      | 3               | 312              | <b>380</b> | 560 | 360   | 360   | 1,5                                     | 5                                       |
| Z-523695.TR4        | 1               | 427              | <b>380</b> | 620 | 388   | 388   | 5                                       | 5                                       |
| Z-510038.TR4        | 1               | 510              | <b>380</b> | 620 | 420   | 420   | 5                                       | 5                                       |
| F-802205.TR4        | 1               | 183              | <b>390</b> | 510 | 350   | 350   | 1,5                                     | 3                                       |
| F-802116.TR4        | 1               | 193              | <b>395</b> | 545 | 288,7 | 268,7 | 5                                       | 7,5                                     |
| F-802116.TR4-H122AA | 2               | 193              | <b>395</b> | 545 | 288,7 | 268,7 | 5                                       | 7,5                                     |
| F-802074.TR4        | 1               | 177              | <b>400</b> | 540 | 280   | 280   | 5                                       | 5                                       |
| Z-534284.TR4        | 1               | 365              | <b>400</b> | 600 | 355   | 355   | 3                                       | 6                                       |
| Z-575106.TR4        | 1               | 327              | <b>420</b> | 592 | 432   | 432   | 6                                       | 6                                       |
| Z-539120.TR4        | 1               | 370              | <b>420</b> | 620 | 355   | 355   | 4                                       | 6                                       |
| Z-510036.TR4        | 1               | 1 000            | <b>420</b> | 760 | 500   | 500   | 9,5                                     | 9,5                                     |
| F-802231.TR4-H122AA | 2               | 235              | <b>430</b> | 570 | 336   | 336   | 1,5                                     | 6,4                                     |
| Z-540515.TR4        | 3               | 432              | <b>440</b> | 620 | 454   | 454   | 6                                       | 6                                       |
| Z-546420.TR4        | 1               | 440              | <b>440</b> | 620 | 454   | 454   | 6                                       | 6                                       |
| F-802166.TR4        | 1               | 406              | <b>440</b> | 650 | 355   | 355   | 5                                       | 6                                       |
| F-802063.TR4-H122AD | 1 <sup>1)</sup> | 277              | <b>450</b> | 595 | 368   | 368   | 3                                       | 6                                       |
| F-802223.TR4        | 1               | 278              | <b>460</b> | 610 | 360   | 360   | 2,5                                     | 5                                       |
| F-802208.TR4        | 1               | 368              | <b>460</b> | 625 | 421   | 421   | 3                                       | 9                                       |
| Z-537420.TR4        | 1               | 585              | <b>460</b> | 700 | 420   | 420   | 6                                       | 5                                       |
| Z-549349.TR4        | 1               | 950              | <b>460</b> | 760 | 520   | 520   | 3                                       | 6                                       |
| F-802021.TR4        | 1               | 242              | <b>475</b> | 600 | 368   | 368   | 2                                       | 6                                       |
| F-802034.TR4        | 1               | 220              | <b>475</b> | 620 | 380   | 380   | 2                                       | 6                                       |
| Z-533018.TR4        | 1               | 470              | <b>475</b> | 660 | 450   | 450   | 4                                       | 6                                       |
| Z-549928.TR4        | 1               | 545              | <b>480</b> | 700 | 420   | 420   | 6                                       | 6                                       |
| F-802004.TR4        | 1               | 498              | <b>500</b> | 670 | 515   | 515   | 5                                       | 5                                       |
| Z-535689.TR4        | 3               | 551              | <b>500</b> | 680 | 515   | 515   | 6                                       | 6                                       |
| Z-533019.TR4        | 1               | 560              | <b>500</b> | 680 | 515   | 515   | 6                                       | 6                                       |
| Z-532030.TR4        | 1               | 540              | <b>500</b> | 720 | 400   | 400   | 3                                       | 6                                       |
| Z-537903.TR4        | 1               | 564              | <b>500</b> | 720 | 420   | 420   | 7,5                                     | 7,5                                     |
| Z-527904.TR4        | 1               | 1 250            | <b>500</b> | 830 | 570   | 570   | 9,5                                     | 9,5                                     |

<sup>1)</sup> With lubrication holes through the inner ring central rib.



Design 2  
With sheet steel cages



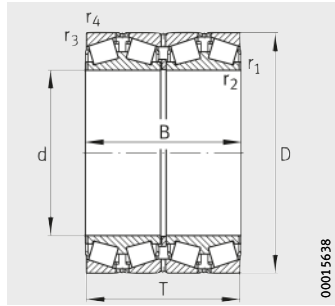
Design 3  
With pin cages

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     |
| 5 900               | 11 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 1 020              |
| 6 600               | 12 700                  | 0,35                | 1,95  | 2,9   | 1,9   | 1 180              |
| 6 800               | 13 100                  | 0,35                | 1,95  | 2,9   | 1,9   | 1 220              |
| 7 900               | 13 300                  | 0,43                | 1,57  | 2,34  | 1,5   | 1 190              |
| 8 500               | 14 200                  | 0,46                | 1,47  | 2,19  | 1,4   | 1 290              |
| 5 300               | 12 200                  | 0,33                | 2,03  | 3,02  | 2     | 1 180              |
| 4 150               | 8 500                   | 0,47                | 1,43  | 2,12  | 1,4   | 780                |
| 4 150               | 8 500                   | 0,47                | 1,43  | 2,12  | 1,4   | 780                |
| 4 150               | 8 500                   | 0,47                | 1,43  | 2,12  | 1,4   | 780                |
| 6 700               | 13 500                  | 0,34                | 1,99  | 2,96  | 1,9   | 1 230              |
| 8 000               | 17 000                  | 0,4                 | 1,68  | 2,5   | 1,6   | 1 560              |
| 6 800               | 12 800                  | 0,43                | 1,58  | 2,36  | 1,6   | 1 150              |
| 12 300              | 20 200                  | 0,35                | 1,95  | 2,9   | 1,9   | 1 700              |
| 5 800               | 13 500                  | 0,44                | 1,54  | 2,29  | 1,5   | 1 260              |
| 9 300               | 20 000                  | 0,4                 | 1,68  | 2,5   | 1,6   | 1 830              |
| 9 000               | 19 500                  | 0,4                 | 1,68  | 2,5   | 1,6   | 1 770              |
| 7 200               | 13 400                  | 0,48                | 1,42  | 2,11  | 1,4   | –                  |
| 6 800               | 15 900                  | 0,33                | 2,03  | 3,02  | 2     | 1 470              |
| 6 600               | 14 600                  | 0,38                | 1,77  | 2,64  | 1,7   | 1 330              |
| 8 100               | 18 300                  | 0,33                | 2,03  | 3,02  | 2     | 1 660              |
| 8 800               | 16 600                  | 0,43                | 1,56  | 2,32  | 1,5   | –                  |
| 12 500              | 22 400                  | 0,45                | 1,5   | 2,23  | 1,5   | –                  |
| 6 300               | 16 000                  | 0,26                | 2,55  | 3,8   | 2,5   | –                  |
| 7 100               | 17 000                  | 0,29                | 2,32  | 3,45  | 2,3   | –                  |
| 9 300               | 20 500                  | 0,37                | 1,8   | 2,69  | 1,8   | 1 830              |
| 9 150               | 18 000                  | 0,32                | 2,11  | 3,14  | 2,1   | –                  |
| 9 900               | 23 900                  | 0,33                | 2,03  | 3,02  | 2     | 2 130              |
| 11 100              | 26 000                  | 0,29                | 2,32  | 3,45  | 2,3   | 2 310              |
| 10 700              | 24 600                  | 0,29                | 2,32  | 3,45  | 2,3   | 2 190              |
| 8 800               | 16 800                  | 0,46                | 1,48  | 2,2   | 1,5   | 1 440              |
| 9 300               | 18 800                  | 0,33                | 2,04  | 3,04  | 2     | 1 630              |
| 14 300              | 25 000                  | 0,37                | 1,8   | 2,69  | 1,8   | –                  |

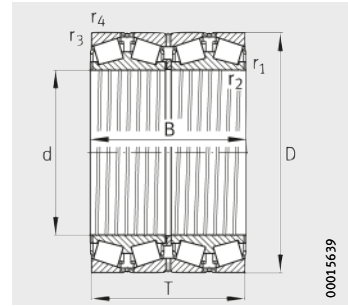


# Tapered roller bearings

Four-row,  
in metric sizes



Design 1  
With sheet steel cages



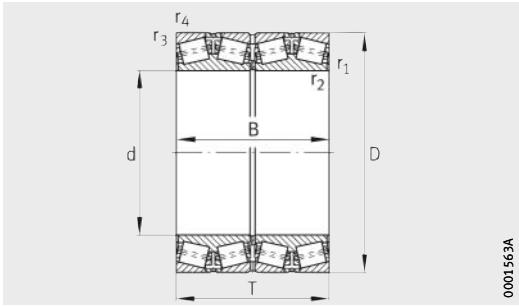
Design 2  
With sheet steel cages

Dimension table (continued) · Dimensions in mm

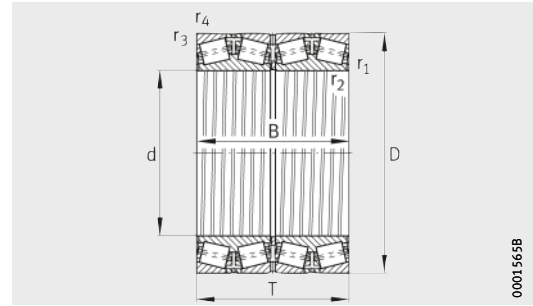
| Designation            | Design          | Mass<br>m<br>≈kg | Dimensions |      |     |     |   |   |
|------------------------|-----------------|------------------|------------|------|-----|-----|---|---|
|                        |                 |                  | d          | D    | T   | B   | r <sub>1</sub> , r <sub>2</sub><br>min. | r <sub>3</sub> , r <sub>4</sub><br>min. |
| F-802020.TR4-H122BR    | 2               | 314              | 510        | 655  | 379 | 377 | 1,5                                     | 6,4                                     |
| Z-546305.TR4           | 1               | 735              | 530        | 780  | 450 | 450 | 3                                       | 6                                       |
| Z-579827.TR4           | 1               | 1380             | 530        | 880  | 544 | 544 | 9,5                                     | 9,5                                     |
| F-802005.TR4           | 1               | 810              | 533        | 810  | 450 | 450 | 7,5                                     | 7,5                                     |
| Z-565904.TR4           | 3               | 786              | 535        | 750  | 560 | 560 | 7,5                                     | 7,5                                     |
| F-802202.TR4           | 1               | 373              | 540        | 690  | 400 | 400 | 2,5                                     | 5                                       |
| Z-518888.TR4           | 1               | 224              | 560        | 740  | 460 | 460 | 3,3                                     | 6,4                                     |
| Z-539193.TR4           | 3               | 1690             | 560        | 920  | 620 | 620 | 9,5                                     | 9,5                                     |
| Z-577804.TR4           | 3               | 753              | 570        | 780  | 515 | 515 | 6                                       | 6                                       |
| Z-533792.TR4           | 1               | 975              | 570        | 810  | 590 | 590 | 3                                       | 6                                       |
| F-802178.TR4-H122BD    | 1               | 485              | 600        | 800  | 365 | 365 | 6                                       | 5                                       |
| Z-568986.TR4           | 1               | 968              | 600        | 870  | 488 | 488 | 3                                       | 7,5                                     |
| F-802250.TR4           | 1               | 460              | 620        | 800  | 365 | 365 | 2,5                                     | 5                                       |
| Z-534756.TR4           | 1               | 1130             | 630        | 920  | 515 | 515 | 9,5                                     | 9,5                                     |
| F-800695.TR4           | 4               | 1400             | 635        | 900  | 660 | 660 | 9,5                                     | 9,5                                     |
| F-802141.TR4-M         | 3               | 1850             | 645        | 1030 | 560 | 560 | 9,5                                     | 15                                      |
| F-802061.TR4-M         | 3               | 1840             | 647        | 1030 | 560 | 560 | 9,5                                     | 15                                      |
| F-802057.TR4-M         | 3               | 1450             | 650        | 915  | 674 | 674 | 3,6                                     | 6,1                                     |
| F-802060.TR4-M         | 3               | 1830             | 650        | 1030 | 560 | 560 | 9,5                                     | 15                                      |
| Z-510033.TR4           | 1               | 472              | 660        | 855  | 320 | 320 | 5                                       | 7,5                                     |
| Z-534757.TR4           | 3               | 2310             | 660        | 1070 | 650 | 650 | 9,5                                     | 9,5                                     |
| Z-537905.TR4           | 3               | 2700             | 670        | 1090 | 710 | 710 | 9,5                                     | 9,5                                     |
| Z-566305.TR4           | 4               | 1150             | 676        | 910  | 620 | 620 | 4                                       | 7,5                                     |
| F-802121.TR4-AD-H122EK | 2               | 617              | 710        | 900  | 410 | 410 | 3,3                                     | 6,4                                     |
| F-802121.TR4           | 1               | 617              | 710        | 900  | 410 | 410 | 3,3                                     | 6,4                                     |
| F-802121.TR4-H122BR    | 1               | 617              | 710        | 900  | 410 | 410 | 3,3                                     | 6,4                                     |
| F-802121.TR4-M         | 3 <sup>1)</sup> | 638              | 710        | 900  | 410 | 410 | 3,3                                     | 6,4                                     |
| F-802121.TR4-M-H122AA  | 4               | 638              | 710        | 900  | 410 | 410 | 3,3                                     | 6,4                                     |
| F-802121.TR4-M-H122BR  | 3               | 638              | 710        | 900  | 410 | 410 | 3,3                                     | 6,4                                     |
| F-802121.TR4-M-H122DZ  | 4               | 634              | 710        | 900  | 410 | 410 | 3,3                                     | 6,4                                     |

<sup>1)</sup> With plus tolerances for the bearing bore and outside diameter.





Design 3  
With pin cages



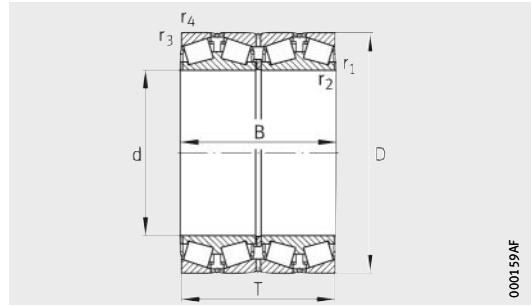
Design 4  
With pin cages

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     |
| 7 300               | 18 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 1 610              |
| 11 200              | 21 600                  | 0,36                | 1,86  | 2,77  | 1,8   | –                  |
| 14 300              | 27 500                  | 0,46                | 1,47  | 2,19  | 1,4   | 2 240              |
| 10 600              | 20 600                  | 0,37                | 1,82  | 2,71  | 1,8   | 1 720              |
| 13 000              | 29 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 2 500              |
| 7 800               | 21 200                  | 0,37                | 1,8   | 2,69  | 1,8   | 1 870              |
| 10 000              | 24 500                  | 0,32                | 2,14  | 3,18  | 2,1   | –                  |
| 18 700              | 34 000                  | 0,4                 | 1,68  | 2,5   | 1,6   | 2 750              |
| 12 700              | 29 500                  | 0,36                | 1,87  | 2,79  | 1,8   | 2 500              |
| 14 300              | 32 000                  | 0,31                | 2,15  | 3,2   | 2,1   | 2 700              |
| 8 600               | 18 200                  | 0,32                | 2,08  | 3,1   | 2     | 1 500              |
| 12 900              | 26 000                  | 0,43                | 1,57  | 2,34  | 1,5   | 2 090              |
| 7 500               | 18 300                  | 0,37                | 1,83  | 2,73  | 1,8   | –                  |
| 14 600              | 29 500                  | 0,43                | 1,57  | 2,34  | 1,5   | 2 370              |
| 18 600              | 44 000                  | 0,33                | 2,03  | 3,02  | 2     | –                  |
| 18 400              | 34 000                  | 0,31                | 2,16  | 3,22  | 2,1   | 2 650              |
| 18 400              | 34 000                  | 0,31                | 2,16  | 3,22  | 2,1   | 2 650              |
| 18 700              | 45 000                  | 0,33                | 2,03  | 3,02  | 2     | 3 650              |
| 18 400              | 34 000                  | 0,31                | 2,16  | 3,22  | 2,1   | 2 650              |
| 7 700               | 17 800                  | 0,35                | 1,91  | 2,84  | 1,9   | 1 440              |
| 23 100              | 42 500                  | 0,31                | 2,15  | 3,2   | 2,1   | 3 200              |
| 26 000              | 50 000                  | 0,29                | 2,32  | 3,45  | 2,3   | 3 800              |
| 17 400              | 41 500                  | 0,37                | 1,8   | 2,69  | 1,8   | 3 400              |
| 10 400              | 26 500                  | 0,35                | 1,95  | 2,9   | 1,9   | –                  |
| 10 500              | 26 500                  | 0,35                | 1,95  | 2,9   | 1,9   | 2 140              |
| 10 500              | 26 500                  | 0,35                | 1,95  | 2,9   | 1,9   | 2 140              |
| 10 600              | 27 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 2 180              |
| 10 600              | 27 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 2 180              |
| 10 600              | 27 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 2 180              |
| 10 600              | 27 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 2 180              |



# Tapered roller bearings

Four-row,  
in metric sizes

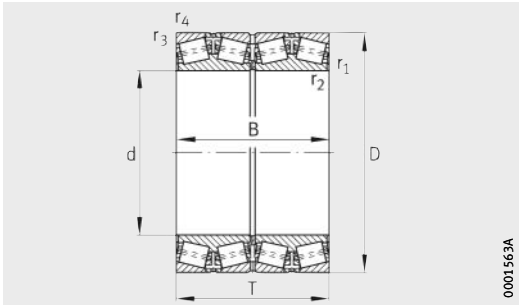


Design 1  
With sheet steel cages

Dimension table (continued) · Dimensions in mm

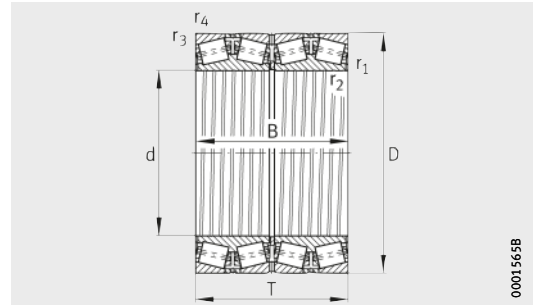
| Designation                  | Design          | Mass<br>m<br>≈kg | Dimensions   |         |       |       |                    |                    |
|------------------------------|-----------------|------------------|--------------|---------|-------|-------|--------------------|--------------------|
|                              |                 |                  | d            | D       | T     | B     | $r_1, r_2$<br>min. | $r_3, r_4$<br>min. |
| <b>F-802263.TR4-M-H122AA</b> | 4               | 895              | <b>730</b>   | 940     | 500   | 500   | 3                  | 6                  |
| <b>F-802033.TR4-M</b>        | 3               | 712              | <b>750</b>   | 950     | 410   | 410   | 6                  | 6                  |
| <b>Z-572275.TR4</b>          | 3               | 2 540            | <b>750</b>   | 1 130   | 690   | 690   | 9,5                | 9,5                |
| <b>Z-581213.TR4</b>          | 3               | 4 110            | <b>750</b>   | 1 220   | 840   | 840   | 12                 | 12                 |
| <b>Z-533277.TR4</b>          | 1               | 1 300            | <b>785</b>   | 1 040   | 560   | 560   | 6                  | 12                 |
| <b>Z-549321.TR4</b>          | 3               | 2 870            | <b>840</b>   | 1 170   | 840   | 840   | 6                  | 6                  |
| <b>Z-522129.TR4</b>          | 3               | 5 290            | <b>850</b>   | 1 360   | 910   | 910   | 5                  | 9,5                |
| <b>Z-525433.TR4</b>          | 3               | 605              | <b>935</b>   | 1 150   | 710   | 710   | 3                  | 6                  |
| <b>Z-533780.TR4</b>          | 3               | 4 250            | <b>950</b>   | 1 360   | 880   | 880   | 12                 | 12                 |
| <b>Z-531009.TR4</b>          | 3               | 3 820            | <b>1 000</b> | 1 333,5 | 952,5 | 952,5 | 4,8                | 12,7               |
| <b>F-802070.01.TR4-M</b>     | 3 <sup>1)</sup> | 3 690            | <b>1 070</b> | 1 400   | 889,6 | 890   | 5,1                | 13,2               |
| <b>Z-577801.TR4</b>          | 3               | 5 150            | <b>1 320</b> | 1 760   | 800   | 800   | 7,5                | 12                 |
| <b>Z-521936.TR4</b>          | 4               | 6 700            | <b>1 370</b> | 1 765   | 1 050 | 1 035 | 5                  | 12                 |
| <b>Z-543378.TR4</b>          | 3               | 7 300            | <b>1 400</b> | 1 820   | 1 160 | 1 160 | 6,4                | 12,7               |
| <b>Z-533447.TR4</b>          | 3               | 9 840            | <b>1 500</b> | 1 950   | 1 230 | 1 230 | 12                 | 12                 |
| <b>Z-534898.TR4</b>          | 3               | 7 870            | <b>1 600</b> | 1 950   | 1 230 | 1 230 | 12                 | 6                  |
| <b>Z-535133.TR4</b>          | 3               | 11 500           | <b>1 600</b> | 2 060   | 1 300 | 1 300 | 12                 | 12                 |
| <b>Z-535105.TR4</b>          | 3               | 16 960           | <b>1 600</b> | 2 240   | 1 300 | 1 300 | 7,5                | 15                 |

<sup>1)</sup> Bearing with four outer rings.



0001563A

Design 3  
With pin cages



0001565B

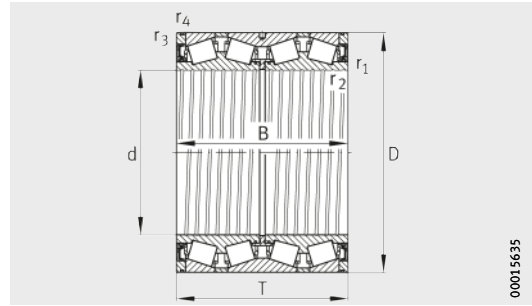
Design 4  
With pin cages

| Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load |
|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$<br>kN     |
| 14 400              | 36 500                  | 0,35                | 1,95  | 2,9   | 1,9   | 2 950              |
| 11 400              | 29 000                  | 0,35                | 1,95  | 2,9   | 1,9   | –                  |
| 24 300              | 49 000                  | 0,49                | 1,38  | 2,06  | 1,4   | 3 650              |
| 32 500              | 64 000                  | 0,32                | 2,12  | 3,15  | 2,1   | –                  |
| 16 300              | 42 000                  | 0,41                | 1,63  | 2,43  | 1,6   | 3 300              |
| 30 000              | 72 000                  | 0,29                | 2,31  | 3,44  | 2,3   | –                  |
| 39 000              | 78 000                  | 0,32                | 2,12  | 3,15  | 2,1   | –                  |
| 22 800              | 69 500                  | 0,26                | 2,55  | 3,8   | 2,5   | –                  |
| 36 500              | 85 000                  | 0,37                | 1,8   | 2,69  | 1,8   | 6 100              |
| 33 500              | 98 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 7 200              |
| 32 500              | 91 500                  | 0,36                | 1,87  | 2,79  | 1,8   | –                  |
| 38 500              | 97 000                  | 0,35                | 1,95  | 2,9   | 1,9   | 6 400              |
| 51 000              | 152 000                 | 0,33                | 2,03  | 3,02  | 2     | 10 100             |
| 51 000              | 151 000                 | 0,38                | 1,78  | 2,65  | 1,7   | 9 900              |
| 64 000              | 190 000                 | 0,32                | 2,12  | 3,15  | 2,1   | 12 300             |
| 57 000              | 215 000                 | 0,26                | 2,55  | 3,8   | 2,5   | 13 900             |
| 73 000              | 225 000                 | 0,26                | 2,55  | 3,8   | 2,5   | 14 200             |
| 81 500              | 212 000                 | 0,4                 | 1,68  | 2,5   | 1,6   | –                  |



# Tapered roller bearings

Four-row,  
sealed on both sides

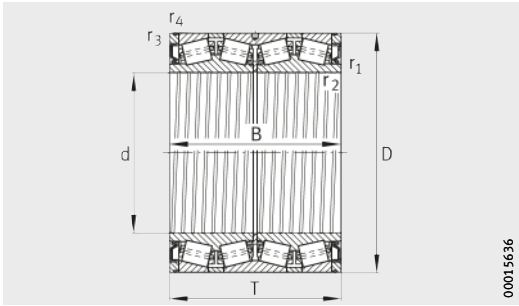


Design 5  
With sheet steel cages

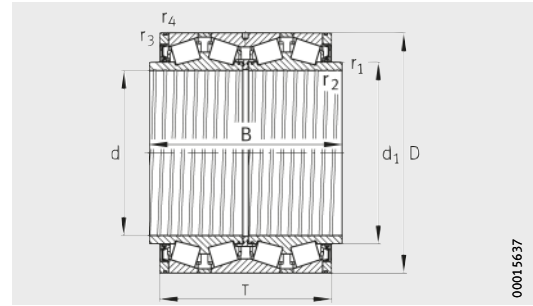
**Dimension table** - Dimensions in mm

| Designation           | Design          | Mass<br>m<br>≈kg | Dimensions     |         |         |         |
|-----------------------|-----------------|------------------|----------------|---------|---------|---------|
|                       |                 |                  | d              | D       | T       | B       |
| F-802160.TR4          | 5               | 79               | <b>216,103</b> | 330,2   | 269,875 | 263,525 |
| Z-576479.TR4          | 5               | 164              | <b>228,6</b>   | 400,05  | 296,875 | 296,875 |
| Z-573745.TR4          | 5               | 52               | <b>234,95</b>  | 327,025 | 196,85  | 196,85  |
| F-802190.TR4          | 5               | 69               | <b>241,478</b> | 349,148 | 228,6   | 228,6   |
| F-802082.TR4          | 5               | 42,5             | <b>244,475</b> | 327,025 | 193,675 | 193,675 |
| F-802192.TR4-H122AE   | 5               | 123              | <b>244,475</b> | 381     | 304,8   | 304,8   |
| F-802066.TR4          | 5               | 83               | <b>254</b>     | 358,775 | 269,875 | 269,875 |
| Z-578395.TR4          | 6               | 180              | <b>260,35</b>  | 422,275 | 317,5   | 314,325 |
| F-802011.TR4          | 5               | 60,4             | <b>266,7</b>   | 355,6   | 228,6   | 230,188 |
| F-802011.TR4-H122AE   | 5 <sup>1)</sup> | 60,6             | <b>266,7</b>   | 355,6   | 228,6   | 230,188 |
| Z-573688.TR4          | 5               | 115              | <b>266,7</b>   | 393,7   | 269,878 | 269,878 |
| Z-580961.TR4          | 5               | 84               | <b>273,05</b>  | 381     | 244,475 | 244,475 |
| F-802193.TR4-H122AE   | 5 <sup>1)</sup> | 100              | <b>276,225</b> | 393,7   | 269,878 | 269,878 |
| Z-575940.TR4          | 5               | 106              | <b>279,4</b>   | 393,7   | 269,878 | 269,878 |
| F-802101.TR4-A250-300 | 5               | 74               | <b>285,75</b>  | 380,898 | 244,475 | 244,475 |
| F-802096.TR4          | 5               | 117              | <b>288,925</b> | 406,4   | 298,45  | 298,45  |
| F-802071.TR4-H122AG   | 5               | 128              | <b>304,648</b> | 438,048 | 279,4   | 280,99  |
| F-802079.TR4          | 5               | 104              | <b>304,8</b>   | 419,1   | 269,875 | 269,875 |
| Z-577249.TR4          | 5               | 106              | <b>304,902</b> | 412,648 | 266,7   | 266,7   |
| F-802025.TR4          | 5               | 98,6             | <b>304,902</b> | 412,648 | 266,7   | 266,7   |
| F-802025.TR4-H122AF   | 5               | 98,1             | <b>304,902</b> | 412,648 | 266,7   | 266,7   |
| Z-567640.TR4          | 7               | 113              | <b>304,902</b> | 412,648 | 266,7   | 336,55  |
| F-802072.TR4-H122AG   | 5               | 128              | <b>305,003</b> | 438,048 | 279,4   | 280,99  |
| F-802081.TR4-H122AE   | 5 <sup>1)</sup> | 102              | <b>317,5</b>   | 422,275 | 269,875 | 269,875 |
| Z-581035.TR4          | 5               | 168              | <b>317,5</b>   | 447,675 | 327,025 | 327,025 |
| F-802068.TR4          | 5               | 97               | <b>330,302</b> | 438,023 | 254     | 247,65  |
| Z-576210.TR4          | 5               | 193              | <b>333,375</b> | 469,9   | 342,9   | 342,9   |
| F-802108.TR4-H122AG   | 5               | 109              | <b>341,312</b> | 457,098 | 254     | 254     |
| Z-578862.TR4          | 5               | 119              | <b>343,052</b> | 457,098 | 254     | 254     |
| F-802003.TR4-H122AF   | 5               | 108              | <b>343,052</b> | 457,098 | 254     | 254     |
| F-802003.TR4-H122AG   | 5               | 108              | <b>343,052</b> | 457,098 | 254     | 254     |
| F-802025.TR4-H122BJ   | 5 <sup>1)</sup> | 108              | <b>343,052</b> | 457,098 | 254     | 254     |
| F-802029.TR4          | 5               | 208              | <b>346,075</b> | 488,95  | 358,775 | 358,775 |

<sup>1)</sup> Without helical grooves in the inner ring bore.



Design 6  
With pin cages



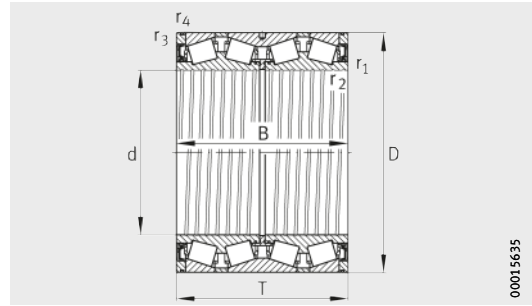
Design 7  
With sheet steel cages

| r <sub>1</sub> , r <sub>2</sub> | r <sub>3</sub> , r <sub>4</sub> | d <sub>1</sub> | Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    |
|---------------------------------|---------------------------------|----------------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|
|                                 |                                 |                | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN |
| min.                            | min.                            |                |                              |                                |                     |                |                |                |                       |
| 1,5                             | 3,3                             | –              | 2 200                        | 3 750                          | 0,55                | 1,24           | 1,84           | 1,21           | –                     |
| 3,3                             | 3,3                             | –              | 3 800                        | 5 500                          | 0,33                | 2,02           | 3              | 1,97           | 560                   |
| 1,5                             | 3,3                             | –              | 1 620                        | 2 900                          | 0,46                | 1,48           | 2,2            | 1,45           | 295                   |
| 1,5                             | 3,3                             | –              | 2 120                        | 3 650                          | 0,37                | 1,8            | 2,69           | 1,76           | –                     |
| 1,5                             | 3,3                             | –              | 1 470                        | 2 700                          | 0,47                | 1,43           | 2,12           | 1,4            | 255                   |
| 3,3                             | 4,8                             | –              | 3 450                        | 5 700                          | 0,45                | 1,51           | 2,24           | 1,47           | –                     |
| 1,5                             | 3,3                             | –              | 2 700                        | 5 100                          | 0,35                | 1,95           | 2,9            | 1,91           | 540                   |
| 6,4                             | 3,3                             | –              | 3 900                        | 6 200                          | 0,33                | 2,03           | 3,02           | 1,98           | 630                   |
| 1,5                             | 2                               | –              | 2 190                        | 4 400                          | 0,36                | 1,87           | 2,79           | 1,83           | 470                   |
| 1,5                             | 2                               | –              | 2 190                        | 4 400                          | 0,36                | 1,87           | 2,79           | 1,83           | 470                   |
| 1,5                             | 3,3                             | –              | 3 000                        | 5 400                          | 0,45                | 1,49           | 2,22           | 1,46           | 560                   |
| 1,5                             | 3,3                             | –              | 2 500                        | 4 900                          | 0,43                | 1,57           | 2,34           | 1,53           | 500                   |
| 1,5                             | 3,3                             | –              | 3 000                        | 5 400                          | 0,45                | 1,49           | 2,22           | 1,46           | 560                   |
| 1,5                             | 3,3                             | –              | 3 000                        | 5 400                          | 0,45                | 1,49           | 2,22           | 1,46           | 560                   |
| 1,5                             | 3,3                             | –              | 2 600                        | 5 300                          | 0,43                | 1,56           | 2,33           | 1,53           | –                     |
| 3,3                             | 3,3                             | –              | 3 600                        | 6 950                          | 0,35                | 1,95           | 2,9            | 1,91           | –                     |
| 3,3                             | 3,3                             | –              | 3 550                        | 6 300                          | 0,47                | 1,43           | 2,12           | 1,4            | 630                   |
| 3,3                             | 6,4                             | –              | 3 150                        | 5 900                          | 0,49                | 1,38           | 2,06           | 1,35           | 600                   |
| 3,3                             | 2                               | –              | 2 800                        | 5 500                          | 0,52                | 1,31           | 1,95           | 1,28           | 560                   |
| 3,3                             | 3,3                             | –              | 3 050                        | 6 100                          | 0,32                | 2,12           | 3,15           | 2,07           | 620                   |
| 3,3                             | 3,3                             | –              | 3 050                        | 6 100                          | 0,32                | 2,12           | 3,15           | 2,07           | 620                   |
| 3,3                             | 3,3                             | 330,2          | 3 050                        | 6 100                          | 0,32                | 2,12           | 3,15           | 2,07           | 620                   |
| 3,3                             | 3,3                             | –              | 3 550                        | 6 300                          | 0,47                | 1,43           | 2,12           | 1,4            | 630                   |
| 1,5                             | 3,3                             | –              | 3 050                        | 6 500                          | 0,32                | 2,12           | 3,15           | 2,07           | 660                   |
| 3,3                             | 3,3                             | –              | 4 250                        | 8 500                          | 0,33                | 2,03           | 3,02           | 1,98           | –                     |
| 1,5                             | 3,3                             | –              | 2 700                        | 5 300                          | 0,43                | 1,57           | 2,34           | 1,53           | 520                   |
| 3,3                             | 3,3                             | –              | 4 750                        | 9 500                          | 0,34                | 1,97           | 2,93           | 1,92           | –                     |
| 1,5                             | 3,3                             | –              | 3 000                        | 6 000                          | 0,47                | 1,43           | 2,12           | 1,4            | 590                   |
| 1,5                             | 3,3                             | –              | 2 600                        | 5 200                          | 0,7                 | 0,97           | 1,44           | 0,94           | 500                   |
| 1,5                             | 3,3                             | –              | 3 000                        | 6 000                          | 0,47                | 1,43           | 2,12           | 1,4            | 590                   |
| 1,5                             | 3,3                             | –              | 3 000                        | 6 000                          | 0,47                | 1,43           | 2,12           | 1,4            | 590                   |
| 1,5                             | 3,3                             | –              | 3 000                        | 6 000                          | 0,47                | 1,43           | 2,12           | 1,4            | –                     |
| 3,3                             | 3,3                             | –              | 5 000                        | 10 100                         | 0,32                | 2,12           | 3,16           | 2,08           | 990                   |



# Tapered roller bearings

Four-row,  
sealed on both sides



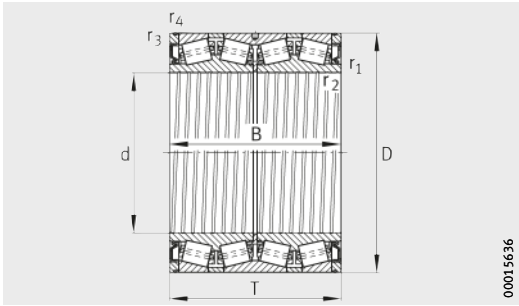
Design 5  
With sheet steel cages

Dimension table (continued) · Dimensions in mm

| Designation                  | Design          | Mass<br>m<br>≈kg | Dimensions     |         |         |         |
|------------------------------|-----------------|------------------|----------------|---------|---------|---------|
|                              |                 |                  | d              | D       | T       | B       |
| F-802023.TR4                 | 5               | 137              | <b>355,6</b>   | 482,6   | 269,875 | 265,112 |
| Z-575032.TR4                 | 7               | 152              | <b>355,6</b>   | 482,6   | 269,875 | 330,2   |
| F-802111.TR4                 | 5               | 177              | <b>355,6</b>   | 488,95  | 317,5   | 317,5   |
| Z-579769.TR4                 | 5               | 255              | <b>368,3</b>   | 523,875 | 382,588 | 382,588 |
| F-802015.TR4                 | 5               | 175              | <b>385,762</b> | 514,35  | 317,5   | 317,5   |
| Z-573326.TR4                 | 5               | 192              | <b>406,4</b>   | 546,1   | 288,925 | 268,288 |
| F-802039.TR4                 | 5               | 182              | <b>406,4</b>   | 546,1   | 288,925 | 288,925 |
| F-802078.TR4                 | 5               | 209              | <b>409,575</b> | 546,1   | 334,962 | 334,962 |
| Z-576306.TR4                 | 5               | 382              | <b>415,925</b> | 590,55  | 434,975 | 434,975 |
| F-802046.TR4-M               | 6               | 385              | <b>415,925</b> | 590,55  | 434,975 | 434,975 |
| Z-564363.TR4                 | 5               | 180              | <b>431,8</b>   | 571,5   | 279,4   | 279,4   |
| F-802013.TR4-M               | 6               | 230              | <b>431,8</b>   | 571,5   | 336,55  | 336,55  |
| F-802044.TR4                 | 5               | 359              | <b>440</b>     | 590     | 480     | 480     |
| F-800917.TR4                 | 5               | 378              | <b>440</b>     | 650     | 353,05  | 353,05  |
| Z-574347.TR4                 | 5               | 229              | <b>444,5</b>   | 571,5   | 355,6   | 355,6   |
| Z-575857.TR4                 | 6               | 470              | <b>447,675</b> | 635     | 463,55  | 463,55  |
| F-802180.TR4                 | 5               | 275              | <b>450</b>     | 595     | 368     | 368     |
| F-802188.TR4                 | 5               | 196              | <b>457,2</b>   | 596,9   | 279,4   | 276,225 |
| F-802042.TR4-M-H122AF        | 6               | 201              | <b>457,2</b>   | 596,9   | 279,4   | 276,225 |
| F-802167.TR4                 | 5               | 286              | <b>460</b>     | 610     | 360     | 360     |
| Z-572067.TR4                 | 5               | 574              | <b>479,425</b> | 679,45  | 495,3   | 495,3   |
| F-802007.TR4-H122BH          | 5 <sup>1)</sup> | 233              | <b>482,6</b>   | 615,95  | 330,2   | 330,2   |
| F-802007.TR4-H122AG          | 5               | 233              | <b>482,6</b>   | 615,95  | 330,2   | 330,2   |
| Z-579990.TR4                 | 5 <sup>2)</sup> | 246              | <b>482,6</b>   | 615,95  | 330,2   | 330,2   |
| F-802260.TR4-H122DN-J44-W72D | 5               | 274              | <b>482,6</b>   | 615,95  | 385     | 385     |
| F-802112.TR4                 | 5               | 283              | <b>482,6</b>   | 615,95  | 400     | 400     |
| F-802143.TR4-H122AG          | 7               | 245              | <b>482,6</b>   | 615,95  | 330,2   | 406,4   |
| F-802149.TR4                 | 7               | 273              | <b>482,6</b>   | 615,95  | 377,825 | 406,4   |
| F-802149.TR4-H122AF          | 7               | 272              | <b>482,6</b>   | 615,95  | 377,825 | 406,4   |
| Z-564537.TR4                 | 7               | 247              | <b>482,6</b>   | 615,95  | 330,2   | 419,1   |
| Z-579576.TR4                 | 5               | 251              | <b>482,6</b>   | 615,95  | 402,05  | 419,1   |
| F-802267.TR4                 | 5               | 250              | <b>489,026</b> | 634,873 | 320,675 | 320,675 |

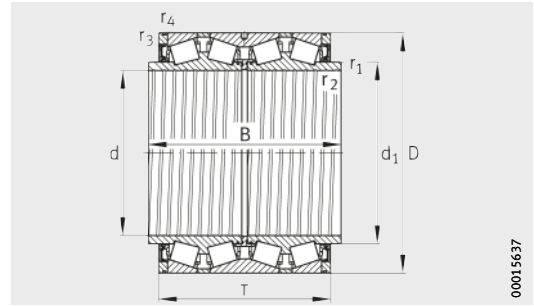
<sup>1)</sup> Without helical grooves in the inner ring bore.

<sup>2)</sup> Bearing with lubrication holes through the inner ring central rib.



00015636

Design 6  
With pin cages



00015637

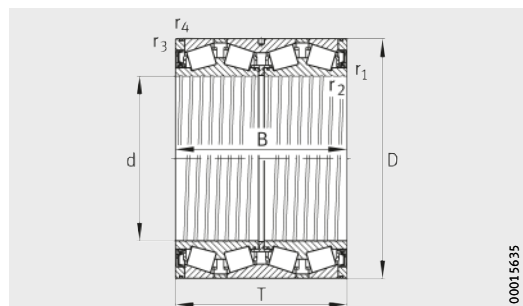
Design 7  
With sheet steel cages

| r <sub>1</sub> , r <sub>2</sub> | r <sub>3</sub> , r <sub>4</sub> | d <sub>1</sub> | Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    |
|---------------------------------|---------------------------------|----------------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|
|                                 |                                 |                | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN |
| min.                            | min.                            |                |                              |                                |                     |                |                |                |                       |
| 1,5                             | 3,3                             | –              | 3 150                        | 6 400                          | 0,49                | 1,36           | 2,03           | 1,33           | 620                   |
| 1,5                             | 3,3                             | 381            | 3 150                        | 6 400                          | 0,49                | 1,36           | 2,03           | 1,33           | 620                   |
| 1,5                             | 3,3                             | –              | 4 450                        | 9 400                          | 0,32                | 2,11           | 3,14           | 2,06           | 920                   |
| 3,3                             | 6,4                             | –              | 5 900                        | 11 900                         | 0,32                | 2,12           | 3,15           | 2,07           | 1 140                 |
| 3,3                             | 3,3                             | –              | 4 400                        | 9 300                          | 0,44                | 1,52           | 2,26           | 1,49           | 890                   |
| 1,5                             | 6,4                             | –              | 3 500                        | 6 700                          | 0,49                | 1,38           | 2,06           | 1,35           | 570                   |
| 0,9                             | 6,4                             | –              | 3 900                        | 7 800                          | 0,48                | 1,41           | 2,1            | 1,38           | 710                   |
| 1,5                             | 6,4                             | –              | 5 000                        | 10 800                         | 0,4                 | 1,69           | 2,52           | 1,65           | 1 010                 |
| –                               | 6,4                             | –              | 7 100                        | 15 000                         | 0,52                | 1,31           | 1,95           | 1,28           | 1 390                 |
| 2,3                             | 6,4                             | –              | 7 500                        | 15 600                         | 0,34                | 1,97           | 2,94           | 1,93           | 1 440                 |
| 1,5                             | 3,3                             | –              | 3 900                        | 7 600                          | 0,62                | 1,1            | 1,63           | 1,07           | 670                   |
| 1,5                             | 3,3                             | –              | 4 800                        | 10 500                         | 0,46                | 1,48           | 2,21           | 1,45           | 980                   |
| 3                               | 5                               | –              | 7 800                        | 18 400                         | 0,35                | 1,95           | 2,9            | 1,91           | 1 710                 |
| 5                               | 6                               | –              | 6 300                        | 11 400                         | 0,37                | 1,8            | 2,69           | 1,76           | –                     |
| 3,3                             | 18,7X25°                        | –              | 5 400                        | 12 900                         | 0,35                | 1,95           | 2,9            | 1,91           | –                     |
| 3,3                             | 6,4                             | –              | 8 500                        | 18 000                         | 0,35                | 1,95           | 2,9            | 1,91           | 1 620                 |
| 3                               | 3                               | –              | 5 600                        | 13 600                         | 0,29                | 2,31           | 3,44           | 2,26           | 1 260                 |
| 1,5                             | 3,3                             | –              | 3 700                        | 7 700                          | 0,47                | 1,43           | 2,12           | 1,4            | 640                   |
| 1,5                             | 3,3                             | –              | 3 800                        | 8 200                          | 0,61                | 1,11           | 1,66           | 1,09           | 740                   |
| 2,5                             | 5                               | –              | 5 600                        | 12 900                         | 0,39                | 1,72           | 2,57           | 1,69           | –                     |
| 3,3                             | 3,3                             | –              | 9 900                        | 20 900                         | 0,35                | 1,92           | 2,86           | 1,88           | 1 850                 |
| 6,4                             | 3,3                             | –              | 5 200                        | 12 300                         | 0,36                | 1,87           | 2,79           | 1,83           | 1 110                 |
| 6,4                             | 3,3                             | –              | 5 200                        | 12 200                         | 0,36                | 1,87           | 2,79           | 1,83           | –                     |
| 6,4                             | 3,3                             | –              | 5 200                        | 12 200                         | 0,36                | 1,87           | 2,79           | 1,83           | –                     |
| 6,4                             | 6,4                             | –              | 6 000                        | 15 000                         | 0,35                | 1,95           | 2,9            | 1,91           | –                     |
| 6,4                             | 6,4                             | –              | 6 300                        | 15 800                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 440                 |
| 4                               | 3,3                             | 514,35         | 5 200                        | 12 300                         | 0,36                | 1,87           | 2,79           | 1,83           | 1 110                 |
| 4                               | 3,3                             | 514,35         | 5 800                        | 14 300                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 300                 |
| 4                               | 3,3                             | 514,35         | 5 800                        | 14 300                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 300                 |
| 3,3                             | 6,4                             | 514,35         | 5 200                        | 12 300                         | 0,36                | 1,87           | 2,79           | 1,83           | 1 110                 |
| 3,3                             | 3,3                             | –              | 5 400                        | 14 000                         | 0,37                | 1,83           | 2,72           | 1,79           | 1 280                 |
| 3,3                             | 3,3                             | –              | 5 200                        | 11 600                         | 0,43                | 1,57           | 2,34           | 1,53           | –                     |



# Tapered roller bearings

Four-row,  
sealed on both sides

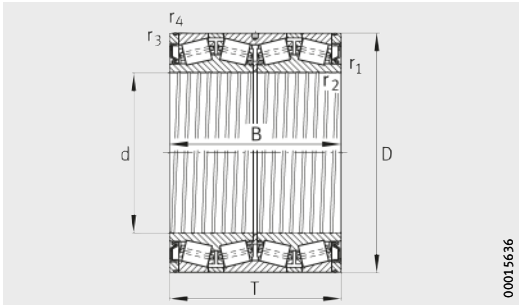


Design 5  
With sheet steel cages

**Dimension table** (continued) · Dimensions in mm

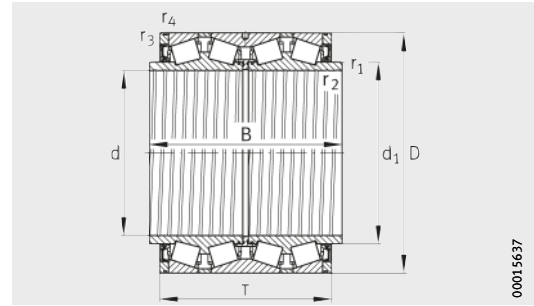
| Designation                  | Design | Mass<br>m<br>≈kg | Dimensions     |           |         |         |
|------------------------------|--------|------------------|----------------|-----------|---------|---------|
|                              |        |                  | d              | D         | T       | B       |
| <b>Z-577346.TR4</b>          | 5      | 632              | <b>501,65</b>  | 711,2     | 520,7   | 520,7   |
| <b>Z-574472.TR4</b>          | 5      | 732              | <b>519,113</b> | 736,6     | 536,575 | 536,575 |
| <b>F-802152.TR4</b>          | 5      | 356              | <b>540</b>     | 690       | 400     | 400     |
| <b>Z-575848.TR4</b>          | 5      | 371              | <b>558,8</b>   | 736,6     | 322,263 | 322,263 |
| <b>F-802080.TR4</b>          | 5      | 512              | <b>558,8</b>   | 736,6     | 457,2   | 455,612 |
| <b>Z-574859.TR4</b>          | 5      | 480              | <b>584,2</b>   | 762       | 401,638 | 396,875 |
| <b>F-802186.TR4</b>          | 5      | 586              | <b>585,788</b> | 771,525   | 479,425 | 479,425 |
| <b>F-802186.TR4-M</b>        | 6      | 594              | <b>585,788</b> | 771,525   | 479,425 | 479,425 |
| <b>F-802171.01.TR4</b>       | 5      | 1 130            | <b>595,312</b> | 844,55    | 615,95  | 615,95  |
| <b>Z-578717.TR4</b>          | 6      | 820              | <b>600</b>     | 850       | 450     | 450     |
| <b>F-802043.TR4-H122AG</b>   | 5      | 426              | <b>609,6</b>   | 787,4     | 361,95  | 361,95  |
| <b>Z-573689.TR4</b>          | 5      | 695              | <b>609,6</b>   | 813,562   | 479,425 | 479,425 |
| <b>Z-580638.TR4</b>          | 6      | 1 360            | <b>635</b>     | 901,7     | 624,05  | 654,05  |
| <b>Z-572660.TR4</b>          | 6      | 1 530            | <b>657,225</b> | 933,45    | 676,275 | 676,275 |
| <b>Z-575037.TR4</b>          | 5      | 970              | <b>679,45</b>  | 901,7     | 552,45  | 552,45  |
| <b>F-802087.TR4-M</b>        | 6      | 522              | <b>685,8</b>   | 876,3     | 355,6   | 352,425 |
| <b>Z-574473.TR4</b>          | 6      | 1 060            | <b>708,025</b> | 930,275   | 565,15  | 565,15  |
| <b>F-802095.TR4</b>          | 5      | 570              | <b>710</b>     | 900       | 410     | 410     |
| <b>F-802095.TR4-M</b>        | 6      | 600              | <b>710</b>     | 900       | 410     | 410     |
| <b>F-802031.TR4</b>          | 5      | 507              | <b>711,2</b>   | 914,4     | 317,5   | 317,5   |
| <b>F-802031.TR4-M</b>        | 6      | 523              | <b>711,2</b>   | 914,4     | 317,5   | 317,5   |
| <b>Z-567922.TR4</b>          | 7      | 575              | <b>711,2</b>   | 914,4     | 317,5   | 425,45  |
| <b>Z-565250.TR4</b>          | 6      | 2 190            | <b>749,3</b>   | 1 066,8   | 736,6   | 723,9   |
| <b>F-802069.TR4-M-H122BU</b> | 6      | 2 640            | <b>863,6</b>   | 1 169,987 | 844,55  | 844,55  |
| <b>Z-576211.TR4</b>          | 6      | 3 360            | <b>863,6</b>   | 1 219,2   | 889     | 876,3   |





00015636

Design 6  
With pin cages



00015637

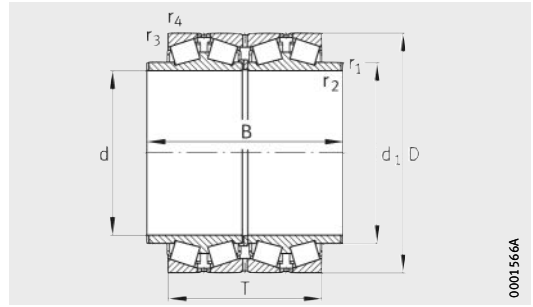
Design 7  
With sheet steel cages

| r <sub>1</sub> , r <sub>2</sub> | r <sub>3</sub> , r <sub>4</sub> | d <sub>1</sub> | Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    |
|---------------------------------|---------------------------------|----------------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|
|                                 |                                 |                | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN |
| min.                            | min.                            |                |                              |                                |                     |                |                |                |                       |
| 3,3                             | 6,4                             | –              | 10 600                       | 22 400                         | 0,37                | 1,8            | 2,69           | 1,76           | 1 960                 |
| 3,3                             | 6,4                             | –              | 11 500                       | 25 000                         | 0,33                | 2,03           | 3,02           | 1,98           | 2 180                 |
| 2,5                             | 5                               | –              | 6 950                        | 17 000                         | 0,37                | 1,8            | 2,69           | 1,76           | –                     |
| 3,3                             | 6,4                             | –              | 5 800                        | 12 500                         | 0,35                | 1,95           | 2,9            | 1,91           | 1 040                 |
| 3,3                             | 6,4                             | –              | 9 000                        | 21 600                         | 0,35                | 1,95           | 2,9            | 1,91           | –                     |
| 3,3                             | 6,4                             | –              | 7 900                        | 17 800                         | 0,47                | 1,43           | 2,12           | 1,4            | 1 510                 |
| 3,3                             | 6,4                             | –              | 9 500                        | 22 700                         | 0,35                | 1,95           | 2,9            | 1,91           | 1 920                 |
| 3,3                             | 6,4                             | –              | 9 800                        | 23 800                         | 0,35                | 1,95           | 2,9            | 1,91           | 2 010                 |
| 3,3                             | 6,4                             | –              | 12 900                       | 32 000                         | 0,38                | 1,78           | 2,66           | 1,75           | –                     |
| 5                               | 7,5                             | –              | 9 700                        | 20 000                         | 0,32                | 2,12           | 3,15           | 2,07           | 1 620                 |
| 3,3                             | 6,4                             | –              | 7 100                        | 16 200                         | 0,4                 | 1,68           | 2,5            | 1,64           | 1 340                 |
| 6,4                             | 3,3                             | –              | 10 500                       | 24 500                         | 0,35                | 1,95           | 2,9            | 1,91           | 2 040                 |
| 3,3                             | 6,4                             | –              | 16 800                       | 38 000                         | 0,33                | 2,03           | 3,02           | 1,98           | 3 100                 |
| 3,3                             | 6,4                             | –              | 17 800                       | 40 000                         | 0,35                | 1,95           | 2,9            | 1,91           | 3 250                 |
| 3,3                             | 6,4                             | –              | 13 500                       | 33 000                         | 0,33                | 2,03           | 3,02           | 1,98           | 2 700                 |
| 3,3                             | 6,4                             | –              | 7 400                        | 17 000                         | 0,4                 | 1,68           | 2,5            | 1,64           | 1 350                 |
| 3,3                             | 6,4                             | –              | 14 000                       | 35 500                         | 0,33                | 2,03           | 3,02           | 1,98           | 2 850                 |
| 3,3                             | 6,4                             | –              | 9 100                        | 20 600                         | 0,37                | 1,8            | 2,69           | 1,76           | 1 640                 |
| 3,3                             | 6,4                             | –              | 9 400                        | 21 600                         | 0,37                | 1,8            | 2,69           | 1,76           | 1 710                 |
| 3,3                             | 6,4                             | –              | 5 850                        | 14 000                         | 0,37                | 1,8            | 2,69           | 1,76           | –                     |
| 3,3                             | 6,4                             | –              | 6 000                        | 14 300                         | 0,37                | 1,8            | 2,69           | 1,76           | –                     |
| 3,3                             | 6,4                             | 767            | 7 900                        | 19 000                         | 0,38                | 1,77           | 2,63           | 1,73           | 1 500                 |
| 25,4X20°                        | 9,7                             | –              | 22 200                       | 49 500                         | 0,35                | 1,95           | 2,9            | 1,91           | 3 750                 |
| 4,8                             | 12,7                            | –              | 25 000                       | 64 000                         | 0,37                | 1,84           | 2,74           | 1,8            | 4 750                 |
| 4,8                             | 12,7                            | –              | 29 000                       | 68 000                         | 0,35                | 1,95           | 2,9            | 1,91           | 5 100                 |



# Tapered roller bearings

Four-row,  
with extended inner rings



0001566A

**Dimension table** - Dimensions in mm

| Designation                        | Mass<br>m<br>≈kg | Dimensions     |         |         |         |                |
|------------------------------------|------------------|----------------|---------|---------|---------|----------------|
|                                    |                  | d              | D       | T       | B       | d <sub>1</sub> |
| <b>F-802176.TR4</b>                | 98               | <b>273,05</b>  | 381     | 244,475 | 304,8   | 304,8          |
| <b>Z-547044.TR4</b>                | 89,5             | <b>279,578</b> | 380,898 | 244,475 | 304,8   | 304,8          |
| <b>Z-522458.TR4</b>                | 82               | <b>285,75</b>  | 380,898 | 244,475 | 314,475 | 300            |
| <b>Z-549895.TR4</b>                | 111              | <b>304,902</b> | 412,648 | 266,7   | 336,55  | 330,2          |
| <b>Z-572368.TR4</b>                | 126              | <b>343,052</b> | 457,098 | 254     | 323,85  | 365,13         |
| <b>F-802120.TR4</b>                | 110              | <b>355,6</b>   | 457,2   | 252,412 | 323,85  | 374,65         |
| <b>Z-547043.TR4</b>                | 150              | <b>355,6</b>   | 482,6   | 269,875 | 330,2   | 381            |
| <b>Z-544260.TR4</b>                | 190              | <b>355,6</b>   | 488,95  | 317,5   | 381     | 381            |
| <b>Z-564155.TR4</b>                | 154              | <b>374,65</b>  | 501,65  | 260,35  | 323,85  | 400,05         |
| <b>Z-541941.TR4</b>                | 210              | <b>431,8</b>   | 571,5   | 279,4   | 368,3   | 457,2          |
| <b>Z-548232.TR4</b>                | 245              | <b>431,8</b>   | 571,5   | 336,55  | 412,75  | 454,03         |
| <b>Z-574289.TR4</b>                | 220              | <b>444,5</b>   | 571,5   | 317,5   | 355,6   | 469,9          |
| <b>Z-548641.TR4</b>                | 199              | <b>482,6</b>   | 615,95  | 330,2   | 406,4   | 514,35         |
| <b>F-802059.TR4-H122AB</b>         | 261              | <b>482,6</b>   | 615,95  | 330,2   | 419,1   | 514,35         |
| <b>Z-548234.TR4</b>                | 680              | <b>501,65</b>  | 711,2   | 520,7   | 603,25  | 539,75         |
| <b>Z-548233.TR4</b>                | 838              | <b>536,575</b> | 761,873 | 558,8   | 638,175 | 577,85         |
| <b>Z-561017.TR4</b>                | 625              | <b>585,788</b> | 771,525 | 479,425 | 555,625 | 622,3          |
| <b>Z-523039.TR4</b>                | 551              | <b>685,8</b>   | 876,3   | 355,6   | 457,2   | 736,6          |
| <b>F-802041.TR4-M<sup>1)</sup></b> | 588              | <b>685,8</b>   | 876,3   | 355,6   | 457,2   | 736,6          |
| <b>Z-532479.TR4<sup>2)</sup></b>   | 588              | <b>711,2</b>   | 914,4   | 317,5   | 425,45  | 774,7          |

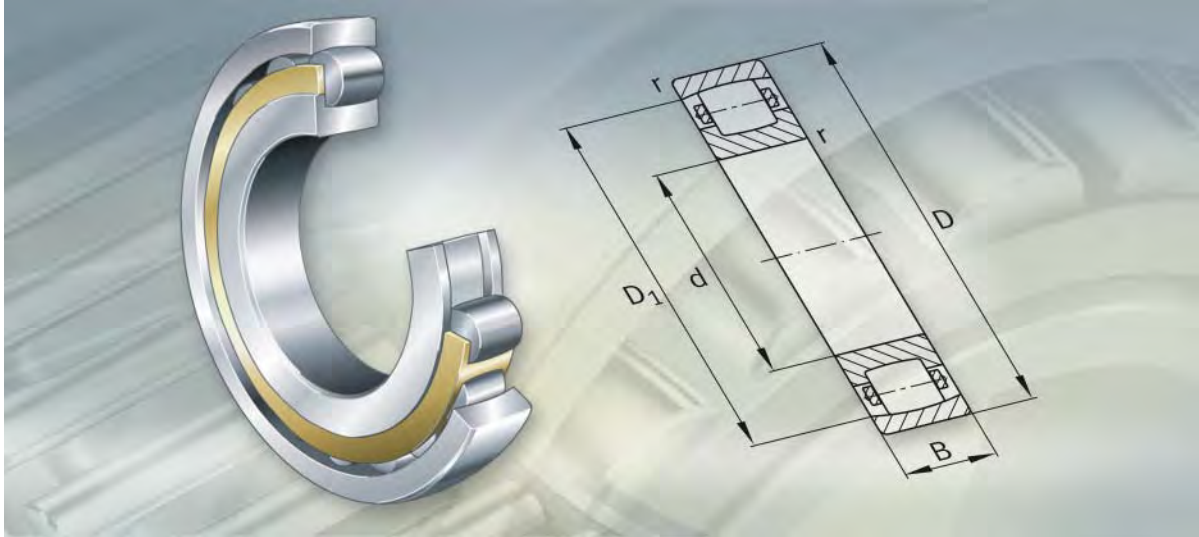
1) With pin cages.

2) Helical grooves in the inner ring bores.

|            |            | Basic load ratings |                   | Calculation factors |       |       |       | Fatigue limit load |
|------------|------------|--------------------|-------------------|---------------------|-------|-------|-------|--------------------|
| $r_1, r_2$ | $r_3, r_4$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ | e                   | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$           |
| min.       | min.       | kN                 | kN                |                     |       |       |       | kN                 |
| 1,5        | 3,3        | 2 600              | 6 100             | 0,42                | 1,6   | 2,39  | 1,57  | 650                |
| 1,5        | 3,3        | 2 600              | 6 100             | 0,42                | 1,6   | 2,39  | 1,57  | 650                |
| 1,5        | 3,3        | 2 600              | 6 100             | 0,42                | 1,6   | 2,39  | 1,57  | 650                |
| 6,4        | 3,3        | 3 650              | 7 700             | 0,32                | 2,12  | 3,15  | 2,07  | 790                |
| 1,5        | 3,3        | 3 450              | 7 100             | 0,47                | 1,43  | 2,12  | 1,4   | –                  |
| 1,5        | 3,3        | 3 450              | 8 100             | 0,32                | 2,12  | 3,15  | 2,07  | 810                |
| 1,5        | 3,3        | 3 550              | 7 900             | 0,45                | 1,51  | 2,25  | 1,48  | 770                |
| 1,5        | 3,3        | 4 900              | 10 800            | 0,39                | 1,71  | 2,54  | 1,67  | 1 060              |
| 1,5        | 3,3        | 3 750              | 7 600             | 0,47                | 1,43  | 2,12  | 1,4   | 730                |
| 1,5        | 3,3        | 4 650              | 9 600             | 0,55                | 1,24  | 1,84  | 1,21  | 890                |
| 1,5        | 6,4        | 5 800              | 13 500            | 0,44                | 1,54  | 2,29  | 1,5   | 1 260              |
| 1,5        | 3,3        | 5 400              | 12 900            | 0,35                | 1,95  | 2,9   | 1,91  | 1 200              |
| 4,1        | 6,4        | 5 400              | 14 000            | 0,37                | 1,83  | 2,72  | 1,79  | 1 280              |
| 3,6        | 6,4        | 5 400              | 14 000            | 0,37                | 1,83  | 2,72  | 1,79  | 1 280              |
| 3,3        | 6,4        | 11 400             | 25 500            | 0,35                | 1,92  | 2,86  | 1,88  | –                  |
| 3,3        | 6,4        | 13 800             | 30 000            | 0,3                 | 2,28  | 3,39  | 2,23  | 2 600              |
| 3,3        | 6,4        | 10 200             | 25 500            | 0,33                | 2,03  | 3,02  | 1,98  | 2 160              |
| 3,3        | 6,4        | 7 800              | 19 900            | 0,41                | 1,66  | 2,47  | 1,62  | 1 620              |
| 3,3        | 6,4        | 8 200              | 21 000            | 0,41                | 1,66  | 2,47  | 1,62  | 1 710              |
| 8,1        | 6,4        | 7 400              | 19 100            | 0,38                | 1,77  | 2,63  | 1,73  | 1 520              |



**FAG**



**Barrel roller bearings**

# Barrel roller bearings

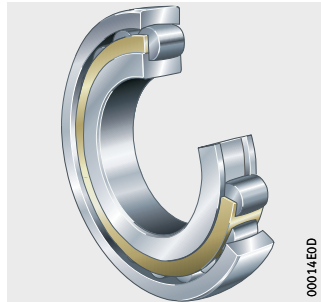
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| <b>Features</b>                     | With tapered bore and with adapter sleeve ..... 597                  |
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# Product overview **Barrel roller bearings**

**Cylindrical bore**

202, 203



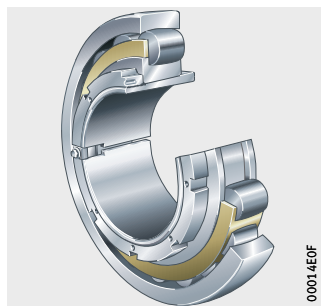
**Tapered bore**

202..-K, 203..-K



**With adapter sleeve**

202..-K + H, 203..-K + H



# Barrel roller bearings

**Features** Barrel roller bearings are single row, self-aligning roller bearings. They comprise solid outer rings with a concave raceway, solid inner rings with two ribs and a cylindrical or tapered bore as well as barrel rollers with cages. The bearings are not separable. Barrel roller bearings are particularly suitable where high radial shock type loads occur and misalignments must be compensated, see section Compensation of angular misalignments. They have only a low axial load carrying capacity.

**With tapered bore and with adapter sleeve** Bearings with a tapered bore have the bore taper 1:12 and the suffix K. These bearings are also available with an adapter sleeve for location. The adapter sleeves are included in the dimension tables and must be specified in addition when ordering.

**Sealing** Barrel roller bearings are not sealed.

**Lubrication** The bearings can be lubricated from the end faces using oil or grease.

**Compensation of angular misalignments** Under normal operating conditions and with a rotating inner ring, barrel roller bearings can swivel approx. 4° about their central position. As a result, they permit skewing between the inner and outer ring and can thus compensate misalignments, shaft deflections and housing deformations. If the outer ring rotates or the inner ring undergoes tumbling motion, the angular adjustment facility is smaller. In this case, please contact us.

**Operating temperature** Barrel roller bearings with brass cages can be used at operating temperatures from -30 °C to +150 °C. Bearings with an outside diameter of more than 120 mm are dimensionally stable up to +200 °C.

**Cages** Barrel roller bearings with solid brass cages have the suffix MB. The cages are guided on the inner ring.

**Suffixes** Suffixes for available designs: see table.

**Available designs**

| Suffix | Description                                  | Design                    |
|--------|--|---------------------------|
| C3     | Radial internal clearance larger than normal | Standard for tapered bore |
| K      | Tapered bore                                 | Standard                  |
| MB     | Solid brass cage                             |                           |



# Barrel roller bearings

## Design and safety guidelines

### Equivalent dynamic bearing load

The equivalent dynamic load  $P$  is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

$$P = F_r + 9,5 \cdot F_a$$

$P$  kN  
Equivalent dynamic bearing load for combined load  
 $F_a$  kN  
Axial dynamic bearing load  
 $F_r$  kN  
Radial dynamic bearing load.

### Equivalent static bearing load

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 5 \cdot F_{0a}$$

$P_0$  kN  
Equivalent static bearing load for combined load  
 $F_{0a}$  kN  
Axial static bearing load  
 $F_{0r}$  kN  
Radial static bearing load.

### Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, roller bearings with cage must therefore be subjected to a minimum radial load of the order of  $P/C_r > 0,02$ .

### Speeds

ISO 15 312 does not give thermal reference speeds for barrel roller bearings.



The dimension tables therefore only state limiting speeds  $n_G$ . These values are for oil lubrication and must not be exceeded.



## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

### Mounting dimensions

The dimension tables give the maximum dimensions of the radii  $r_a$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .

Bearings with a tapered inner ring bore are:

- located either directly on a tapered shaft seat or
- located on a cylindrical shaft seat using an adapter sleeve, locknut and tab washer.

If high axial forces are present, a support ring can be used.

For mounting, attention must be paid to the dimensions of the support ring, see dimension tables.

### Accuracy

The main dimensions of the bearings correspond to DIN 635-1. The dimensional and running tolerances correspond to tolerance class PN to DIN 620-2.

### Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

#### Radial internal clearance

| Bore<br>d<br>mm |       | Radial internal clearance |      |          |      |          |      |          |      |
|-----------------|-------|---------------------------|------|----------|------|----------|------|----------|------|
|                 |       | C2<br>μm                  |      | CN<br>μm |      | C3<br>μm |      | C4<br>μm |      |
| over            | incl. | min.                      | max. | min.     | max. | min.     | max. | min.     | max. |
| 140             | 160   | 20                        | 40   | 40       | 65   | 65       | 95   | 95       | 125  |
| 160             | 180   | 25                        | 45   | 45       | 70   | 70       | 100  | 100      | 130  |
| 180             | 225   | 30                        | 50   | 50       | 75   | 75       | 105  | 105      | 135  |
| 225             | 250   | 35                        | 55   | 55       | 80   | 80       | 110  | 110      | 140  |
| 250             | 280   | 40                        | 60   | 60       | 85   | 85       | 115  | 115      | 145  |

### Radial internal clearance of bearings with tapered bore

Bearings with a tapered bore correspond to internal clearance group C3 to DIN 620-4.

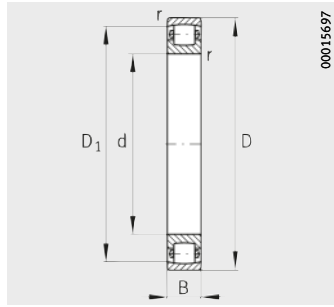
#### Radial internal clearance

| Bore<br>d<br>mm |       | Radial internal clearance |      |          |      |          |      |          |      |
|-----------------|-------|---------------------------|------|----------|------|----------|------|----------|------|
|                 |       | C2<br>μm                  |      | CN<br>μm |      | C3<br>μm |      | C4<br>μm |      |
| over            | incl. | min.                      | max. | min.     | max. | min.     | max. | min.     | max. |
| 140             | 160   | 40                        | 65   | 65       | 95   | 95       | 125  | 125      | 155  |
| 160             | 180   | 45                        | 70   | 70       | 100  | 100      | 130  | 130      | 160  |
| 180             | 225   | 50                        | 75   | 75       | 105  | 105      | 135  | 135      | 165  |
| 225             | 250   | 55                        | 80   | 80       | 110  | 110      | 140  | 140      | 170  |
| 250             | 280   | 60                        | 85   | 85       | 115  | 115      | 145  | 145      | 175  |

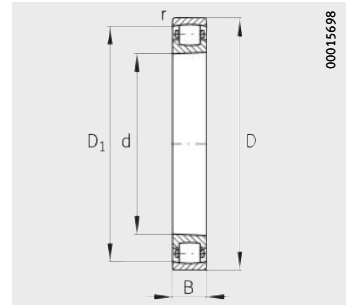


# Barrel roller bearings

Cylindrical or tapered bore



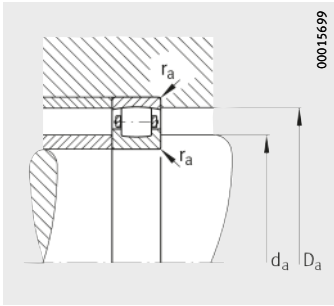
Cylindrical bore



Tapered bore  
K = taper 1:12

**Dimension table** - Dimensions in mm

| Designation          | Mass<br>m<br>≈kg | Dimensions |     |     |           |                     |
|----------------------|------------------|------------|-----|-----|-----------|---------------------|
|                      |                  | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ |
| <b>20330-K-MB-C3</b> | 26,6             | <b>150</b> | 320 | 65  | 4         | 275,8               |
| <b>20330-MB</b>      | 26,9             | <b>150</b> | 320 | 65  | 4         | 275,8               |
| <b>20332-K-MB-C3</b> | 31,3             | <b>160</b> | 340 | 68  | 4         | 293,6               |
| <b>20332-MB</b>      | 31,7             | <b>160</b> | 340 | 68  | 4         | 293,6               |
| <b>20334-K-MB-C3</b> | 37,1             | <b>170</b> | 360 | 72  | 4         | 311,4               |
| <b>20334-MB</b>      | 37,5             | <b>170</b> | 360 | 72  | 4         | 311,4               |
| <b>20236-K-MB-C3</b> | 18,1             | <b>180</b> | 320 | 52  | 4         | 284,3               |
| <b>20236-MB</b>      | 18,4             | <b>180</b> | 320 | 52  | 4         | 284,3               |
| <b>20336-K-MB-C3</b> | 42,8             | <b>180</b> | 380 | 75  | 4         | 329,2               |
| <b>20336-MB</b>      | 43,3             | <b>180</b> | 380 | 75  | 4         | 329,2               |
| <b>20238-K-MB-C3</b> | 22,2             | <b>190</b> | 340 | 55  | 4         | 301,2               |
| <b>20238-MB</b>      | 22,5             | <b>190</b> | 340 | 55  | 4         | 301,2               |
| <b>20338-K-MB-C3</b> | 49,3             | <b>190</b> | 400 | 78  | 5         | 347,1               |
| <b>20338-MB</b>      | 49,8             | <b>190</b> | 400 | 78  | 5         | 347,1               |
| <b>20240-K-MB-C3</b> | 26,4             | <b>200</b> | 360 | 58  | 4         | 319                 |
| <b>20240-MB</b>      | 26,7             | <b>200</b> | 360 | 58  | 4         | 319                 |
| <b>20340-K-MB-C3</b> | 55,6             | <b>200</b> | 420 | 80  | 5         | 364,1               |
| <b>20340-MB</b>      | 56,2             | <b>200</b> | 420 | 80  | 5         | 364,1               |
| <b>20244-K-MB-C3</b> | 36,9             | <b>220</b> | 400 | 65  | 4         | 353,5               |
| <b>20244-MB</b>      | 37,4             | <b>220</b> | 400 | 65  | 4         | 353,5               |
| <b>20344-K-MB-C3</b> | 72,7             | <b>220</b> | 460 | 88  | 5         | 399,4               |
| <b>20344-MB</b>      | 73,6             | <b>220</b> | 460 | 88  | 5         | 399,4               |
| <b>20248-K-MB-C3</b> | 49,9             | <b>240</b> | 440 | 72  | 4         | 388                 |
| <b>20248-MB</b>      | 50,5             | <b>240</b> | 440 | 72  | 4         | 388                 |
| <b>20348-K-MB-C3</b> | 93,1             | <b>240</b> | 500 | 95  | 5         | 434,9               |
| <b>20348-MB</b>      | 94,2             | <b>240</b> | 500 | 95  | 5         | 434,9               |
| <b>20252-K-MB-C3</b> | 67,4             | <b>260</b> | 480 | 80  | 5         | 421,3               |
| <b>20252-MB</b>      | 68,2             | <b>260</b> | 480 | 80  | 5         | 421,3               |
| <b>20352-K-MB-C3</b> | 119              | <b>260</b> | 540 | 102 | 6         | 467,4               |
| <b>20352-MB</b>      | 119              | <b>260</b> | 540 | 102 | 6         | 467,4               |
| <b>20256-K-MB-C3</b> | 70,5             | <b>280</b> | 500 | 80  | 5         | 443,6               |
| <b>20256-MB</b>      | 71,3             | <b>280</b> | 500 | 80  | 5         | 443,6               |



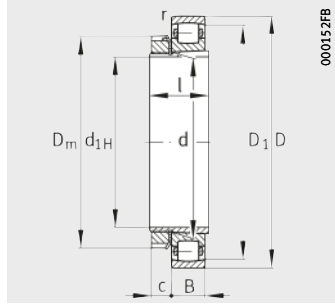
Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                   | Fatigue limit load | Limiting speed    |
|---------------------|-------|-------|--------------------|-------------------|--------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ | $C_{ur}$           | $n_G$             |
| min.                | max.  | max.  | kN                 | kN                | kN                 | $\text{min}^{-1}$ |
| 167                 | 303   | 3     | 720                | 950               | 74                 | 1 200             |
| 167                 | 303   | 3     | 720                | 950               | 74                 | 1 200             |
| 177                 | 323   | 3     | 800                | 1 060             | 82                 | 1 000             |
| 177                 | 323   | 3     | 800                | 1 060             | 82                 | 1 000             |
| 187                 | 343   | 3     | 880                | 1 180             | 91                 | 950               |
| 187                 | 343   | 3     | 880                | 1 180             | 91                 | 950               |
| 197                 | 303   | 3     | 585                | 850               | 74                 | 1 000             |
| 197                 | 303   | 3     | 585                | 850               | 74                 | 1 000             |
| 197                 | 363   | 3     | 965                | 1 290             | 100                | 950               |
| 197                 | 363   | 3     | 965                | 1 290             | 100                | 950               |
| 207                 | 323   | 3     | 640                | 950               | 81                 | 950               |
| 207                 | 323   | 3     | 640                | 950               | 81                 | 950               |
| 210                 | 380   | 4     | 1 040              | 1 400             | 109                | 900               |
| 210                 | 380   | 4     | 1 040              | 1 400             | 109                | 900               |
| 217                 | 343   | 3     | 735                | 1 080             | 91                 | 950               |
| 217                 | 343   | 3     | 735                | 1 080             | 91                 | 950               |
| 220                 | 400   | 4     | 1 080              | 1 460             | 116                | 850               |
| 220                 | 400   | 4     | 1 080              | 1 460             | 116                | 850               |
| 237                 | 383   | 3     | 880                | 1 320             | 109                | 850               |
| 237                 | 383   | 3     | 880                | 1 320             | 109                | 850               |
| 240                 | 440   | 4     | 1 290              | 1 760             | 136                | 750               |
| 240                 | 440   | 4     | 1 290              | 1 760             | 136                | 750               |
| 257                 | 423   | 3     | 1 060              | 1 600             | 129                | 750               |
| 257                 | 423   | 3     | 1 060              | 1 600             | 129                | 750               |
| 260                 | 480   | 4     | 1 530              | 2 120             | 157                | 700               |
| 260                 | 480   | 4     | 1 530              | 2 120             | 157                | 700               |
| 280                 | 460   | 4     | 1 270              | 1 930             | 148                | 700               |
| 280                 | 460   | 4     | 1 270              | 1 930             | 148                | 700               |
| 286                 | 514   | 5     | 1 800              | 2 550             | 185                | 670               |
| 286                 | 514   | 5     | 1 800              | 2 550             | 185                | 670               |
| 300                 | 480   | 4     | 1 290              | 2 000             | 157                | 670               |
| 300                 | 480   | 4     | 1 290              | 2 000             | 157                | 670               |

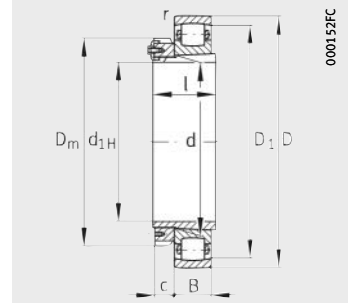


# Barrel roller bearings

With adapter sleeve



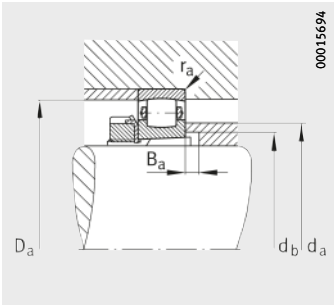
With tab washer  
 $d_{1H} < 200 \text{ mm}$



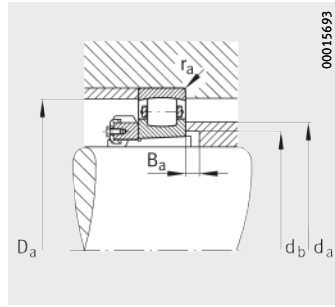
With retaining bracket  
 $d_{1H} \geq 200 \text{ mm}$

**Dimension table** - Dimensions in mm

| Designation          |                | Mass<br>m |                | Dimensions      |     |     |     |      |                |                |     |    |
|----------------------|----------------|-----------|----------------|-----------------|-----|-----|-----|------|----------------|----------------|-----|----|
| Bearing              | Adapter sleeve | Bearing   | Adapter sleeve | d <sub>1H</sub> | d   | D   | B   | r    | D <sub>1</sub> | D <sub>m</sub> | l   | c  |
|                      |                | ≈ kg      | ≈ kg           |                 |     |     |     | min. | ≈              | ≈              |     | ≈  |
| <b>20330-K-MB-C3</b> | <b>H3130</b>   | 26,6      | 5,6            | <b>135</b>      | 150 | 320 | 65  | 4    | 275,8          | 195            | 111 | 26 |
| <b>20332-K-MB-C3</b> | <b>H3132</b>   | 31,3      | 7,81           | <b>140</b>      | 160 | 340 | 68  | 4    | 293,6          | 210            | 119 | 28 |
| <b>20334-K-MB-C3</b> | <b>H3134</b>   | 37,1      | 8,52           | <b>150</b>      | 170 | 360 | 72  | 4    | 311,4          | 220            | 122 | 29 |
| <b>20236-K-MB-C3</b> | <b>H3036</b>   | 18,1      | 7,18           | <b>160</b>      | 180 | 320 | 52  | 4    | 284,3          | 210            | 109 | 30 |
| <b>20336-K-MB-C3</b> | <b>H3036</b>   | 42,8      | 7,18           | <b>160</b>      | 180 | 380 | 75  | 4    | 329,2          | 210            | 109 | 30 |
| <b>20238-K-MB-C3</b> | <b>H3038</b>   | 22,2      | 7,8            | <b>170</b>      | 190 | 340 | 55  | 4    | 301,2          | 220            | 112 | 31 |
| <b>20338-K-MB-C3</b> | <b>H3038</b>   | 49,3      | 7,8            | <b>170</b>      | 190 | 400 | 78  | 5    | 347,1          | 220            | 112 | 31 |
| <b>20240-K-MB-C3</b> | <b>H3040</b>   | 26,4      | 9,5            | <b>180</b>      | 200 | 360 | 58  | 4    | 319            | 240            | 120 | 32 |
| <b>20340-K-MB-C3</b> | <b>H3040</b>   | 55,6      | 9,5            | <b>180</b>      | 200 | 420 | 80  | 5    | 364,1          | 240            | 120 | 32 |
| <b>20244-K-MB-C3</b> | <b>H3044X</b>  | 36,9      | 10,5           | <b>200</b>      | 220 | 400 | 65  | 4    | 353,5          | 260            | 126 | 30 |
| <b>20344-K-MB-C3</b> | <b>H3044X</b>  | 72,7      | 10,5           | <b>200</b>      | 220 | 460 | 88  | 5    | 399,4          | 260            | 126 | 30 |
| <b>20248-K-MB-C3</b> | <b>H3048</b>   | 49,9      | 13,8           | <b>220</b>      | 240 | 440 | 72  | 4    | 388            | 290            | 133 | 34 |
| <b>20348-K-MB-C3</b> | <b>H3048</b>   | 93,1      | 13,8           | <b>220</b>      | 240 | 500 | 95  | 5    | 434,9          | 290            | 133 | 34 |
| <b>20252-K-MB-C3</b> | <b>H3052X</b>  | 67,4      | 16             | <b>240</b>      | 260 | 480 | 80  | 5    | 421,3          | 310            | 145 | 34 |
| <b>20352-K-MB-C3</b> | <b>H3052X</b>  | 119       | 16             | <b>240</b>      | 260 | 540 | 102 | 6    | 467,4          | 310            | 145 | 34 |
| <b>20256-K-MB-C3</b> | <b>H3056</b>   | 70,5      | 18,5           | <b>260</b>      | 280 | 500 | 80  | 5    | 443,6          | 330            | 152 | 38 |



Mounting dimensions  
With tab washer

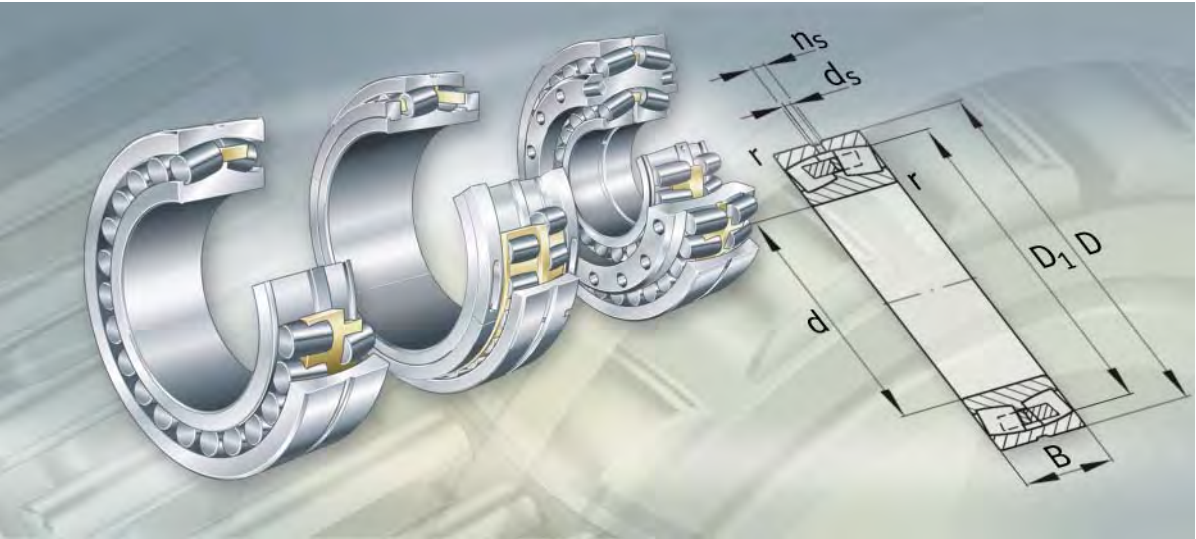


Mounting dimensions  
With retaining bracket

| Mounting dimensions |               |               |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|--|
| $d_a$<br>max.       | $D_a$<br>max. | $d_b$<br>min. | $B_a$<br>min. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN |                                      |  |
| 191                 | 303           | 160           | 23            | 3             | 720                 | 950                     | 74                                   | 1 200  |
| 203                 | 323           | 170           | 26            | 3             | 800                 | 1 060                   | 82                                   | 1 000  |
| 215                 | 343           | 180           | 24            | 3             | 880                 | 1 180                   | 91                                   | 950  |
| 215                 | 303           | 189           | 30            | 3             | 585                 | 850                     | 74                                   | 1 000  |
| 227                 | 363           | 189           | 7             | 3             | 965                 | 1 290                   | 100                                  | 950  |
| 228                 | 323           | 199           | 30            | 3             | 640                 | 950                     | 81                                   | 950  |
| 239                 | 380           | 199           | 6             | 4             | 1 040               | 1 400                   | 109                                  | 900  |
| 240                 | 343           | 210           | 34            | 3             | 735                 | 1 080                   | 91                                   | 950  |
| 252                 | 400           | 210           | 12            | 4             | 1 080               | 1 460                   | 116                                  | 850  |
| 265                 | 383           | 231           | 37            | 3             | 880                 | 1 320                   | 109                                  | 850  |
| 277                 | 440           | 231           | 14            | 4             | 1 290               | 1 760                   | 136                                  | 750  |
| 290                 | 423           | 251           | 31            | 3             | 1 060               | 1 600                   | 129                                  | 750  |
| 301                 | 480           | 251           | 8             | 4             | 1 530               | 2 120                   | 157                                  | 700  |
| 316                 | 460           | 272           | 37            | 4             | 1 270               | 1 930                   | 148                                  | 700  |
| 328                 | 514           | 272           | 15            | 5             | 1 800               | 2 550                   | 185                                  | 670  |
| 334                 | 480           | 292           | 38            | 4             | 1 290               | 2 000                   | 157                                  | 670  |





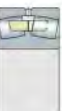


## Spherical roller bearings

With cylindrical or tapered bore

Split

Triple ring bearings



# Spherical roller bearings

## Spherical roller bearings ..... 608

Standard bearings with standardised main dimensions and designations can support axial loads from both sides as well as radial loads and can compensate for angular misalignments. Some sizes are of the X-life design.

Standard spherical roller bearings with a cylindrical ① or a tapered bore ② to ④ are used, for example, in gearboxes, tube mills, jaw crushers, belt conveyors and paper machinery.

Standard bearings with the suffix T41A (~D) are designed specially for the conditions in vibratory machinery.

Sealed special bearings ⑧ have been developed for use in continuous casting plant. These bearings with the designation F-8..PRL have the same main dimensions as standardised spherical roller bearings.

Special bearings of dimension series ⑤ for work rolls in cold pilger rolling machines have a tapered bore and reinforced cages. Their designations (Z-5..241...A-K30) are not standardised.

Special bearings for light section lines ⑥ are designed for a loose fit on the roll journal. These bearings with main dimensions in the series 231, 240 and 241 have non-standardised designations (Z-5).

Special bearings ⑦ with main dimensions in series 249 and a cylindrical or tapered bore are used for the trunnion bearing arrangement in converters. Their designations (Z-5..249) are not standardised.

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## Split spherical roller bearings ..... 702

Split cylindrical roller bearings are used in bearing positions that can only be accessed with difficulty, for example on cranked and very long shafts. These bearings are normally used to replace unsplit spherical roller bearings with adapter sleeves.

In the standard design ⑨, the locking rings are integrated in the inner rings.

Where there are large temperature differences between the shaft and the inner ring halves, bearings with separate locking rings ⑩ and ⑪ are used.

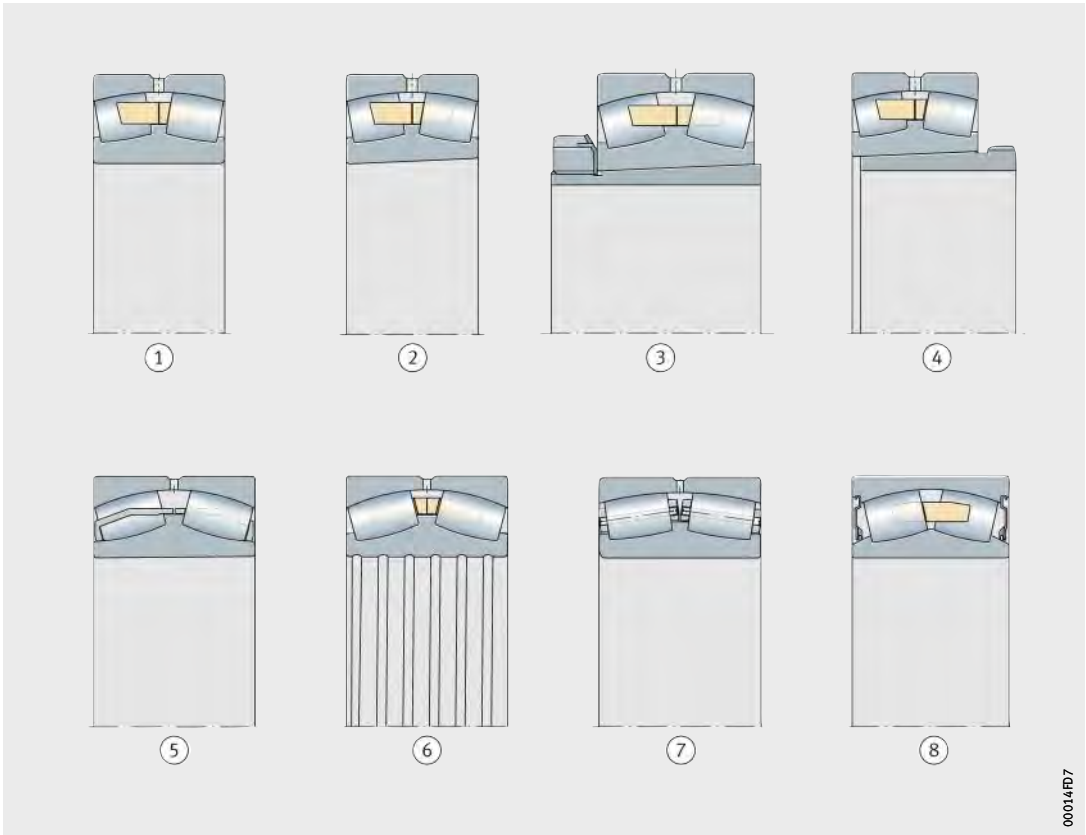
Split spherical roller bearings have non-standardised designations.

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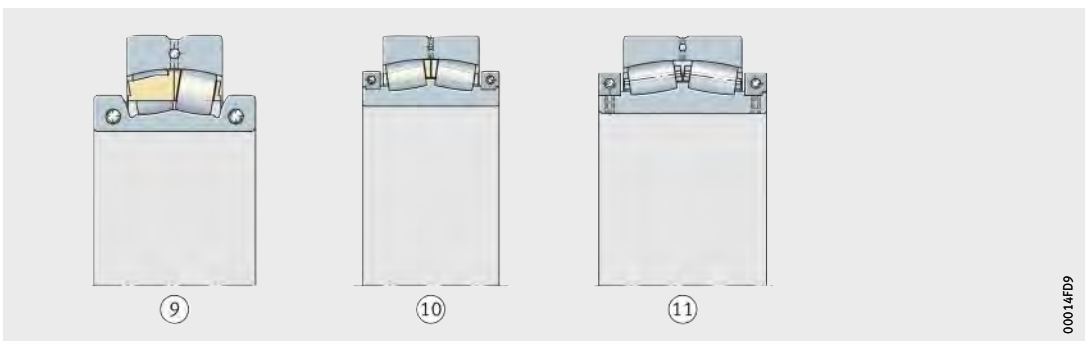
## Triple ring bearings ..... 722

Triple ring bearings ⑫ to ⑭ have been specially developed for deflection compensating rolls in paper machinery. In one design, the inner and outer bearings are spherical roller bearings, in two other designs either the inner or the outer bearing is a spherical roller bearing and the other bearing is a cylindrical roller bearing. The dimensions and designations of these special bearings (Z-5..04.DRGL) are not standardised.

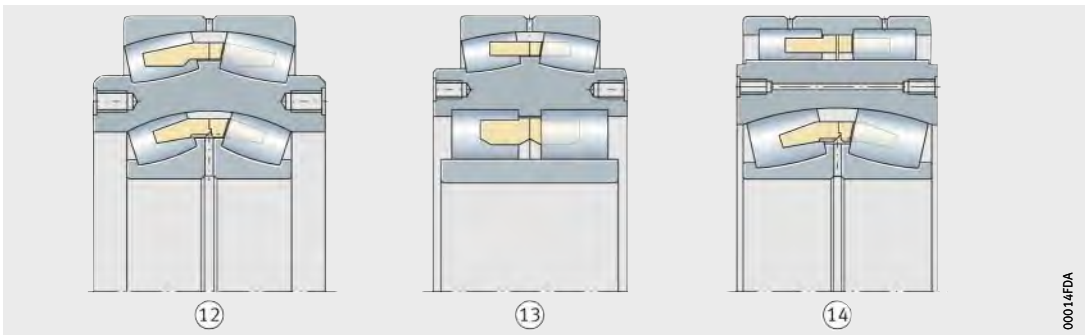




00014FD7



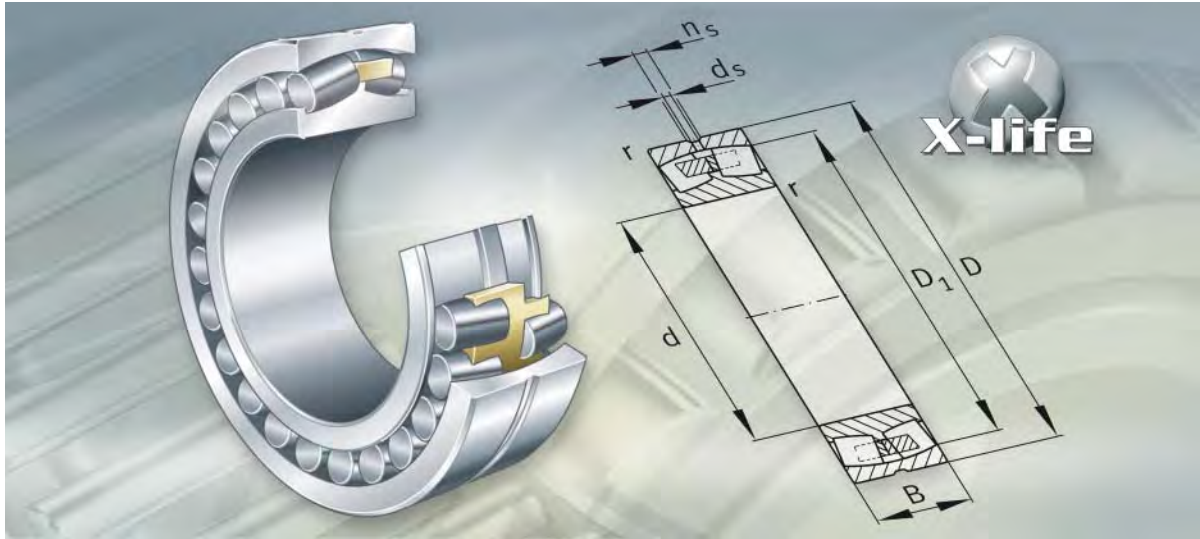
00014FD9



00014FDA



**FAG**



## Spherical roller bearings

# Spherical roller bearings

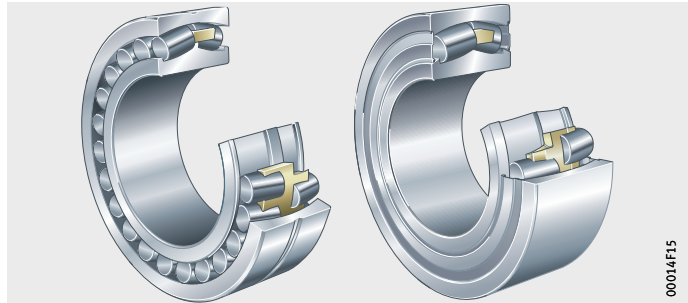
|                                     | Page   |
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| <b>Features</b>                     | X-life ..... 612   |
|                                     | Radial and axial load capacity..... 612  |
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|                                     | Radial internal clearance of bearings with tapered bore..... 627   |
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|                                     | Special spherical roller bearings with tapered bore,<br>for work rolls in cold pilger rolling machines..... 696                  |
|                                     | Special spherical roller bearings with cylindrical bore,<br>for light section lines, with loose fit on the roll journal..... 698 |
|                                     | Special spherical roller bearings,<br>bearings of dimension series 49, with sleeve,<br>for converters ..... 700                  |



# Product overview Spherical roller bearings

## Cylindrical bore Open (sealed)

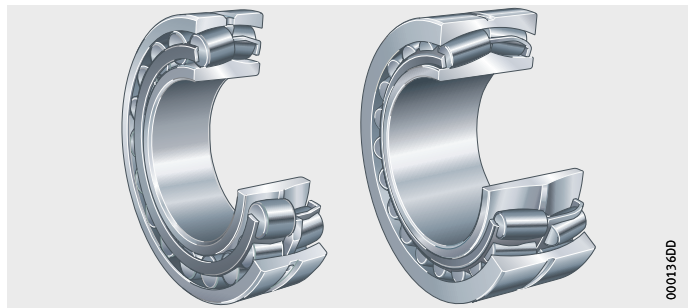
222, 223, 230, 231, 232, 233..-A, 238, 239, 240, 241, 248, 249, Z-5..231, Z-5..232, Z-5..240, Z-5..241, Z-5..249, F-8..231, F-8..240, F-8..PRL-01, F-8..PRL-02



00014F15

## E1 design

222..-E1, 223..-E1, 231..-E1A, 232..-E1A, 241..-E1



000136DD

## Tapered bore

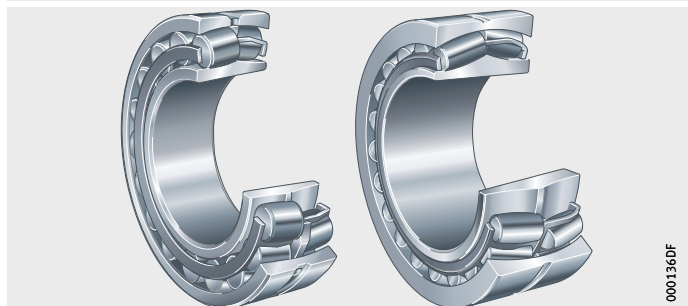
222..-K, 223..-K, 230..-K, 231..-K, 232..-K, 238..-K, 239..-K, 240..-K30, 241..-K30, 248..-K30, 249..-K30, Z-5..241..-A-K30, F-8..241..-A-K30



00014F16

## E1 design

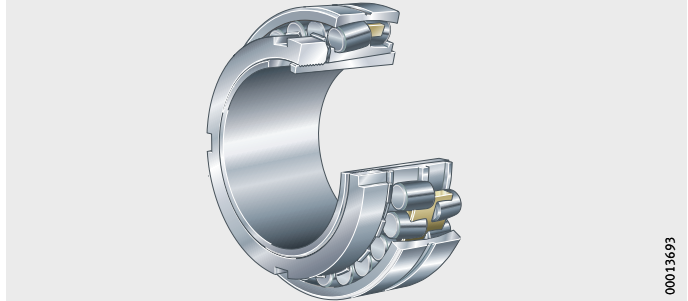
222..-E1-K, 223..-E1-K, 231..-E1A-K, 232..-E1A-K, 241..-E1-K30



000136DF

**With adapter sleeve**

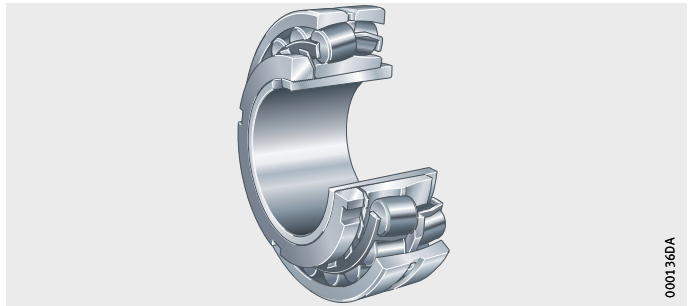
222..-K + H, 223..-K + H, 230..-K + H, 231..-K + H, 232..-K + H,  
239..-K + H, 240..-K30 + H, 241..-K30 + H, 248..-K30 + H,  
249..-K30 + H



00013693

**E1 design**

222..-E1-K + H, 223..-E1-K + H, 231..-E1A-K + H, 232..-E1A-K + H,  
241..-E1-K30 + H



0001360A

**With withdrawal sleeve**

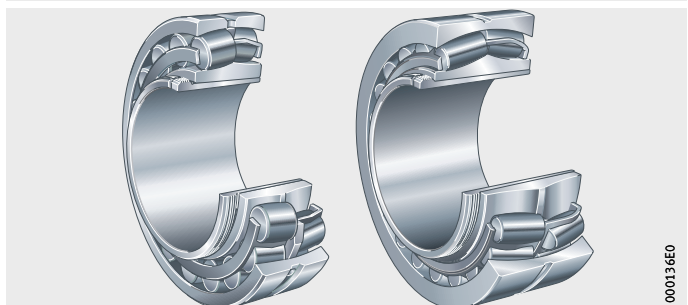
222..-K + AH, 223..-K + AH, 230..-K + AH, 231..-K + AH,  
232..-K + AH, 238..-K + AH, 239..-K + AH, 240..-K30 + AH,  
241..-K30 + AH, 248..-K30 + AH, Z-5..249..-K30 + Z-5..KH



00013692

**E1 design**

222..-E1-K + AH, 223..-E1-K + AH, 231..-E1A-K + AH,  
232..-E1A-K + AH, 241..-E1-K30 + AH



000136E0



# Spherical roller bearings

## Features

Spherical roller bearings are double row, self-retaining units comprising solid outer rings with a concave raceway, solid inner rings and barrel rollers with cages.

The inner rings have cylindrical or tapered bores.

The symmetrical barrel rollers orient themselves freely on the concave outer ring raceway. As a result, shaft flexing and misalignment of the bearing seats are compensated, see section Compensation of angular misalignments.

## X-life

Some sizes of standard spherical roller bearings are of the X-life design. These bearings have improved kinematics and optimised surfaces, are made from higher performance materials and do not have a rigid central rib.

As a result, the basic dynamic load rating and, under identical operating conditions, the basic rating life of the bearings is significantly improved. In certain applications, this means that a smaller bearing arrangement can be designed.

X-life spherical roller bearings have the suffix E1 and are indicated in the dimension tables.

## Radial and axial load capacity

Spherical roller bearings can support axial forces in both directions and high radial forces. They are designed for very high load carrying capacity and, since they have the maximum possible number of large and particularly long barrel rollers, are also suitable for the heaviest loads.

Due to the narrow oscillation between the rollers and raceways, uniform stress distribution is achieved in the bearing.

## Compensation of angular misalignments

Spherical roller bearings compensate for angular misalignments. The permissible adjustment angle is stated for loads  $P < 0,1 \cdot C_r$ , see table.

These adjustment angles are permissible if:

- the angular deviation is constant (static angular misalignment)
- the rotating component is the inner ring.

## Reduced adjustment angle

If the rotating component is the outer ring, the inner ring undergoes tumbling motion or the adjustment angles are larger than stated in the table, the angular adjustment facility is smaller. If such applications are present, please contact us.

## Adjustment angle

| Series  | Adjustment angle<br>° |
|---|-----------------------|
| 222, 222..-E1, 230, 239, 240, 241..-E1                      | 1,5                   |
| 223, 223..-E1, 231, 231..-E1A, 232, 232..-E1A, 233..-A, 241 | 2                     |

Special bearings for converters permit static angular misalignments of up to 10'.

### **Spherical roller bearings with cylindrical bore**

Spherical roller bearings of all series are available with inner rings having a cylindrical bore.

### **Spherical roller bearings with tapered bore**

Spherical roller bearings are also available, with the exception of series 233..-A, with inner rings having a tapered bore. Bearings with the suffix K have the bore taper 1:12, bearings of series 240, 241, 248 and 249 have the bore taper 1:30 and the suffix K30. Special bearings for converters with a tapered bore also have the taper 1:30.

### **Spherical roller bearings with adapter sleeve or withdrawal sleeve**

Spherical roller bearings with a tapered bore are also available with an adapter sleeve, locknut and tab washer or with a withdrawal sleeve. Adapter and withdrawal sleeves must be ordered in addition to the bearing.

### **Sealing**

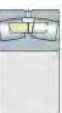
We can by agreement supply sealed and greased bearings. Such designs are used for continuous casting plant, light section lines, pumps, gearboxes and conveying equipment.

### **Lubrication**

Open spherical roller bearings can be lubricated with oil or grease. Standardised spherical roller bearings have a circumferential groove and three lubrication holes in the outer ring for lubrication.



If shafts with a vertical axis are supported using spherical roller bearings, particular attention must be paid to ensuring the reliable provision of lubricant. In such cases, oil lubrication should be used.



# Spherical roller bearings

## Special spherical roller bearings

In addition to spherical roller bearings with standardised dimensions and standardised designations, we can also supply bearings specially designed for particular applications.

### Bearings for vibratory machinery

Special spherical roller bearings of series 223...-E1, 223...-A and 233...-A with the suffix T41A (~D) are matched to the particularly difficult conditions in vibratory machinery.

The bearings must be able to support not only high loads and speeds but also accelerations and centrifugal forces.

They are suitable for dynamic angular misalignments up to  $0,15^\circ$ .

The diameter tolerances are restricted and the radial internal clearance is C4.

Spherical roller bearings of series 223...-E1 have sheet steel cages that are guided on the outer ring and have a special surface treatment. Spherical roller bearings of series 223...-A and 233...-A are fitted with solid brass cages guided on the outer ring.

### Bearings for continuous casting plant

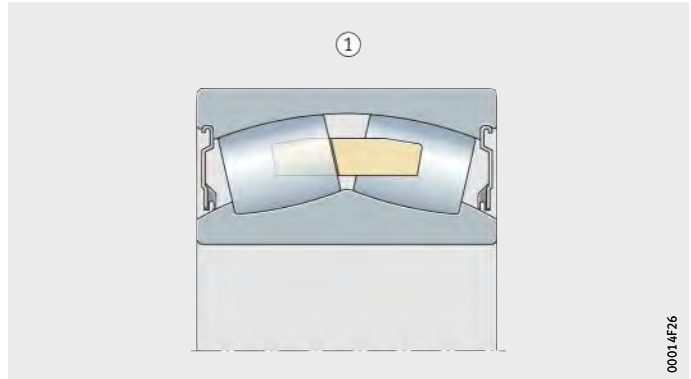
Sealed spherical roller bearings were developed in particular for use in continuous casting plant in order to reduce grease consumption, *Figure 1*.

They are interchangeable with open bearings since they have the same main dimensions. The bearing inner ring does not have a central rib. The bearings are fitted with a solid brass cage.

The seals made from fluoro elastomer and the grease can be used at temperatures up to  $+180^\circ\text{C}$ . The bearings are dimensionally stable up to  $+200^\circ\text{C}$ . They have an increased radial internal clearance to C4.



Observe the safety guidelines on materials containing fluoride.



*Figure 1*  
Sealed spherical roller bearing  
for continuous casting plant

00014F26



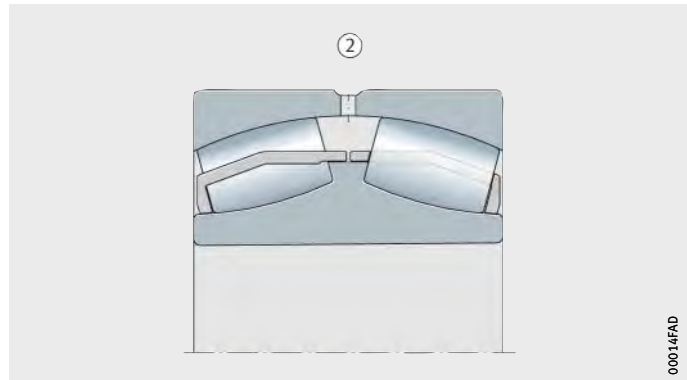
**Bearings for work rolls  
in cold pilger rolling machines**

Special bearings for work rolls in cold pilger rolling machines must be able to support high accelerations. These spherical roller bearings of dimension series 241 have a tapered bore (taper 1:30), *Figure 2*. The reinforced sheet steel cage has a special surface treatment. The radial internal clearance is within the internal clearance group C2 and is marked on the bearing. These special bearings have non-standardised designations (Z-5..-241..-A-K30 or F-8..-241..-A-K30).

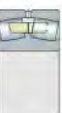
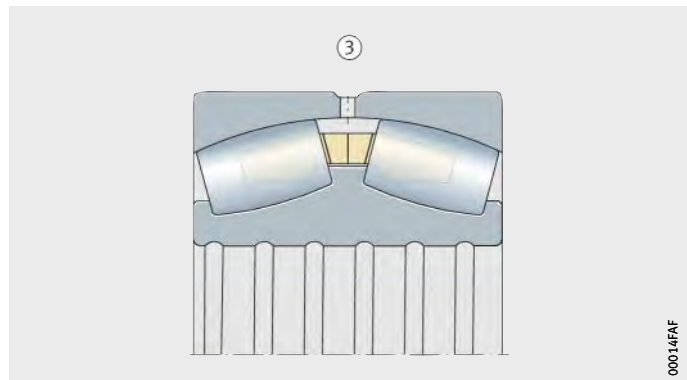
**Bearings for light section lines**

Spherical roller bearings for light section lines or wire mills generally have a loose fit on the roll journal. This is possible if the rolling speed is low and rapid removal from the roll journal is required. The spherical roller bearings have an inner ring made from case hardening steel. In many cases, there is a helical groove in the bore which is intended to allow better lubrication of the fit surfaces. These special bearings have the designation Z-5..231, Z-5..232, Z-5..240, Z-5..241, F-8..231 or F-8..240 and have a reduced radial internal clearance to internal clearance group C2, *Figure 3*.

*Figure 2*  
Special spherical roller bearing  
for work rolls  
in cold pilger rolling machines



*Figure 3*  
Special spherical roller bearing  
for light section lines



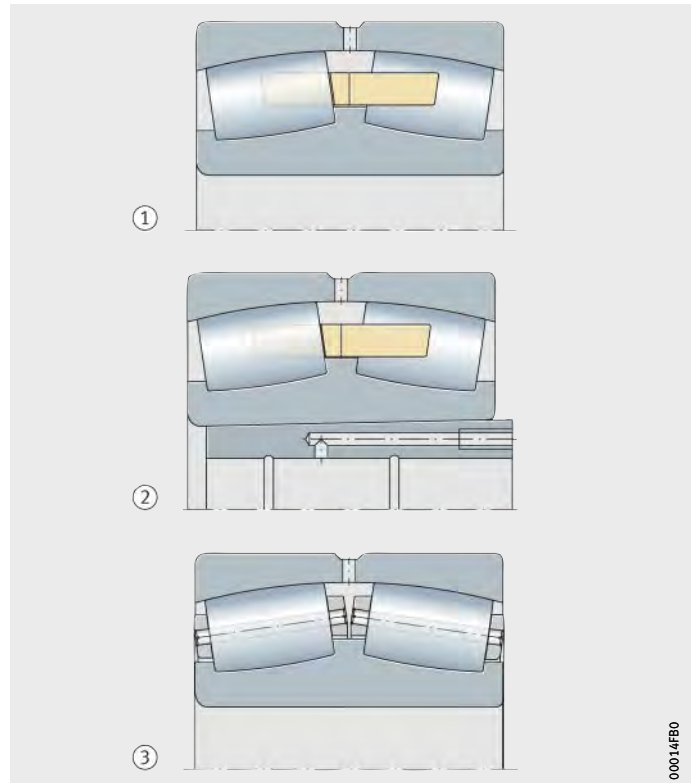
# Spherical roller bearings

## Bearings for converters

Spherical roller bearings with main dimensions in the standardised series 249 are generally used for the trunnion bearing arrangement in converters. The bearings have a cylindrical or tapered bore (taper 1:30).

Bearings with a cylindrical bore are located directly on the converter trunnion, *Figure 4* ①. Bearings with a tapered bore are located on the trunnion using tapered sleeves, *Figure 4* ②. For particular heavy loads, bearings with pin cages are used, *Figure 4* ③ and section Cages, page 617.

Special spherical roller bearings for converters have normal tolerances for radial bearings (tolerance class PN). The radial internal clearance is selected in accordance with the operating temperature and the mounting fits. The special bearings for converters have non-standardised designations (Z-5..249 or Z-5..249..-K30 + Z-5..KH).



- ① Bearing for direct seating on journal
- ② Bearing with tapered bore on sleeve
- ③ Bearing with pin cage

*Figure 4*  
Special spherical roller bearings  
for converters

## Operating temperature

Spherical roller bearings are dimensionally stable up to +200 °C. Open bearings with metal cages can be used at operating temperatures from –30 °C to +200 °C. Sealed special bearings for continuous casting lines can be used at temperatures up to +180 °C.



Due to the fluoro elastomer seals, sealed spherical roller bearings should not be heated to +300 °C or higher. This may occur, for example, if a welding torch is used in the dismantling of the bearings. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the material.

## Cages

The cages for standard spherical roller bearings are shown in the tables, page 618 and page 619.

Standard spherical roller bearings with a rigid central rib on the inner ring (design without suffix E1) have solid brass or sheet brass cages, *Figure 5*, page 618 and *Figure 6*, page 619.

The bearings with sheet metal cages do not have a cage suffix.

In bearings with the suffix MB, the solid brass cages are guided on the inner ring, while bearings with the suffix MA have cages guided on the outer ring.

Bearings with the suffix M have a solid brass cage guided by the rollers.

Where special bearings for converters are subjected to particularly heavy loads, they are fitted with pin cages.

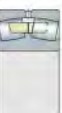
These have very high strength and can in particular accommodate numerous through-drilled rollers.

## X-life bearings

Bearings of the E1 design without a cage suffix have sheet steel cages. The two cage halves are retained by a guiding ring in the outer or inner ring.

In bearings of the design E1, all the sheet steel cages are protected in particular against wear by surface hardening or coating.

In the other bearings of the E1 design, solid brass cages with the suffix M are used.



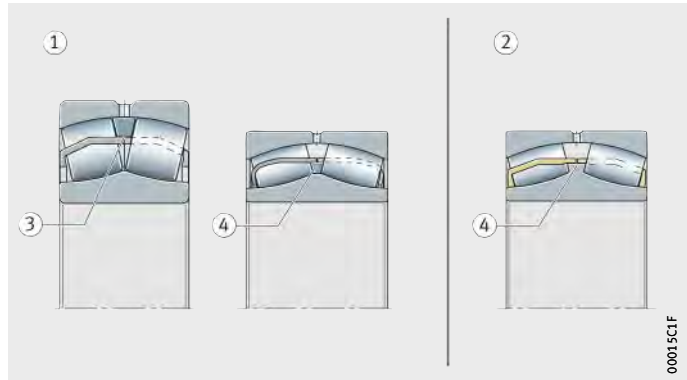
# Spherical roller bearings

## Cage and bore code for standard bearings

| Series                | Sheet metal cage made from |            |            |
|-----------------------|----------------------------|------------|------------|
|                       | Steel                      |            | Brass      |
|                       | Guidance on                |            |            |
|                       | Outer ring                 | Inner ring | Inner ring |
| Bore code             |                            |            |            |
| 222..-E1              | 36                         | –          | –          |
| 223..-E1              | 30                         | –          | –          |
| 223..-E1 (T41A, T41D) | 30                         | –          | –          |
| 241                   | –                          | –          | 40 – 88    |
| 241..-E1              | –                          | 38         | –          |

- ① Sheet steel cages
- ② Sheet brass cage
- ③ Cage guidance on outer ring
- ④ Cage guidance on inner ring

*Figure 5*  
Sheet steel or brass cages

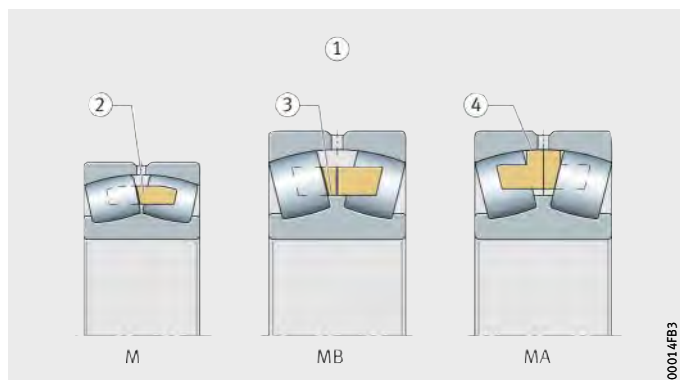


**Cage and bore code**  
(continued)

| Series         | Solid cage made from<br>Brass |                  |                  |
|----------------|-------------------------------|------------------|------------------|
|                | Guidance by<br>rollers        | Guidance on      |                  |
|                |                               | Inner ring<br>MB | Outer ring<br>MA |
|                | M                             |                  |                  |
|                | Bore code                     |                  |                  |
| 222            | –                             | from 38          | –                |
| 223            | –                             | from 34          | –                |
| 223..-A (T41A) | –                             | –                | from 32          |
| 230            | –                             | 44, from 56      | –                |
| 231            | –                             | 44, from 52      | –                |
| 231..-E1A      | 38                            | –                | –                |
| 232            | –                             | from 38          | –                |
| 232..-E1A      | 36                            | –                | –                |
| 233..-A (T41A) | –                             | –                | from 30          |
| 238            | –                             | from 52          | –                |
| 239            | –                             | from 48          | –                |
| 240            | –                             | from 44          | –                |
| 241            | –                             | from 92          | –                |
| 248            | –                             | from 52          | –                |
| 249            | –                             | from 48          | –                |

- ① Solid brass cages
- ② Cage guided by rollers
- ③ Cage guidance on inner ring
- ④ Cage guidance on outer ring

*Figure 6*  
Solid brass cages



# Spherical roller bearings

## Suffixes

Suffixes for available designs: see table.

### Available designs

| Suffix | Description   | Design   |
|--------|---|----------|
| A      | Modified internal construction  | Standard |
| B      | Modified internal construction  |          |
| E1     | Increased capacity design   |          |
| K      | Tapered bore, taper 1:12  |          |
| K30    | Tapered bore, taper 1:30  |          |
| M      | Solid brass cage, guided by rollers   |          |
| MA     | Solid brass cage, guided on outer ring  |          |
| MB     | Solid brass cage, guided on inner ring  |          |
| T41A   | For oscillating load with restricted diameter tolerances, radial internal clearance C4                                  |          |
| T41D   | For oscillating load with restricted diameter tolerances, radial internal clearance C4, bore with thin chromium coating |          |

## Design and safety guidelines

### Equivalent dynamic bearing load

#### Load ratio and equivalent dynamic load

The equivalent dynamic load  $P$  is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

| Load ratio               | Equivalent dynamic load              |
|--------------------------|--------------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r + Y_1 \cdot F_a$            |
| $\frac{F_a}{F_r} > e$    | $P = 0,67 \cdot F_r + Y_2 \cdot F_a$ |

$P$  kN  
Equivalent dynamic bearing load for combined load  
 $F_a$  kN  
Axial dynamic bearing load  
 $F_r$  kN  
Radial dynamic bearing load  
 $e, Y_1, Y_2$  –  
Factors, see dimension tables.

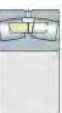
### Equivalent static bearing load

The equivalent static load  $P_0$  is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$  kN  
Equivalent static bearing load for combined load  
 $F_{0a}$  kN  
Axial static bearing load  
 $F_{0r}$  kN  
Radial static bearing load  
 $Y_0$  –  
Factor, see dimension tables.



# Spherical roller bearings

## Static load safety factor for converter bearings

For converter bearings, the requirement is normally:

$$S_0 \geq 2$$

$$S_0 = \frac{C_{0r}}{P_0}$$

$S_0$  –  
Static load safety factor

$C_{0r}$  kN  
Basic static load rating, see dimension tables

$P_0$  kN  
Equivalent static bearing load for combined load.

For locating bearings:

$$P_{0F} = F_{0rF} + Y_0 \cdot (F_{0a} + F_{0a1})$$

For non-locating bearings:

$$P_{0L} = F_{0rL} + Y_0 \cdot F_{0a1}$$

$F_{0a}$  kN  
Maximum axial static bearing load

$F_{0rF}$  kN  
Maximum radial static bearing load for locating bearings

$F_{0rL}$  kN  
Maximum radial static bearing load for non-locating bearings

$Y_0$  –  
Factor, see dimension tables

$F_{0a1} = \mu \cdot F_{0rL}$  kN  
Reaction force due to non-locating bearing displacement

$\mu = 0,15$  –  
Friction factor for bush.



### Minimum radial load

The minimum radial load on the spherical roller bearings should be:

- $P = 0,02 \cdot C_r$
- $P = 0,015 \cdot C_r$  for bearings of E1 design.

### Axial load carrying capacity

Spherical roller bearings are suitable for axial loads in both directions. If very high loads occur in combination with very high speeds, the increased friction and bearing temperature must be taken into consideration.

### Speeds



The limiting speeds  $n_G$  in the dimension tables must not be exceeded.

### Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

### Mounting dimensions

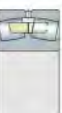
The dimension tables give the maximum dimensions of the radii  $r_a$  and the diameters of the abutment shoulders  $D_a$ ,  $d_a$ .

In order to achieve acceptable running of the spherical roller bearings, the abutment shoulders must be no smaller than  $D_1$  and no larger than  $d_2$ , see dimension tables.

Bearings with a tapered inner ring bore are:

- located directly on a tapered shaft seat
- located on cylindrical shaft seats by means of adapter sleeves or
- located on cylindrical shaft seats by means of withdrawal sleeves.

If high axial forces are present, a support ring can be used for adapter sleeves. For mounting, attention must be paid to the dimensions of the support ring, see dimension table.



# Spherical roller bearings

## Reduced radial internal clearance in mounting

When bearings with a tapered bore are mounted, there is a reduction in the radial internal clearance.

The values given in the tables will ensure secure seating on the shaft, see following table and table, page 625.

### Reduction in radial internal clearance and displacement distance on taper 1:12

| Nominal bearing bore diameter<br>d<br>mm |       | Reduction in radial internal clearance<br>mm |      | Displacement distance on taper 1:12 |      |              |      | Control value for minimum radial internal clearance after mounting |          |          |
|--|-------|--|------|-------------------------------------|------|--------------|------|--|----------|----------|
|  |       |  |      | Shaft<br>mm                         |      | Sleeve<br>mm |      | CN<br>mm   | C3<br>mm | C4<br>mm |
| over                                     | incl. | min.   | max. | min.                                | max. | min.         | max. | min.   | min.     | min.     |
| 140                                      | 160   | 0,075  | 0,1  | 1,2                                 | 1,6  | 1,3          | 1,7  | 0,055  | 0,09     | 0,13     |
| 160                                      | 180   | 0,08   | 0,11 | 1,3                                 | 1,7  | 1,4          | 1,9  | 0,06   | 0,1      | 0,15     |
| 180                                      | 200   | 0,09   | 0,13 | 1,4                                 | 2    | 1,5          | 2,2  | 0,07   | 0,1      | 0,16     |
| 200                                      | 225   | 0,1  | 0,14 | 1,6                                 | 2,2  | 1,7          | 2,4  | 0,08   | 0,12     | 0,18     |
| 225                                      | 250   | 0,11   | 0,15 | 1,7                                 | 2,4  | 1,8          | 2,6  | 0,09   | 0,13     | 0,2      |
| 250                                      | 280   | 0,12   | 0,17 | 1,9                                 | 2,6  | 2            | 2,9  | 0,1  | 0,14     | 0,22     |
| 280                                      | 315   | 0,13   | 0,19 | 2                                   | 3    | 2,2          | 3,2  | 0,11   | 0,15     | 0,24     |
| 315                                      | 355   | 0,15   | 0,21 | 2,4                                 | 3,4  | 2,6          | 3,6  | 0,12   | 0,17     | 0,26     |
| 355                                      | 400   | 0,17   | 0,23 | 2,6                                 | 3,6  | 2,9          | 3,9  | 0,13   | 0,19     | 0,29     |
| 400                                      | 450   | 0,2  | 0,26 | 3,1                                 | 4,1  | 3,4          | 4,4  | 0,13   | 0,2      | 0,31     |
| 450                                      | 500   | 0,21   | 0,28 | 3,3                                 | 4,4  | 3,6          | 4,8  | 0,16   | 0,23     | 0,35     |
| 500                                      | 560   | 0,24   | 0,32 | 3,7                                 | 5    | 4,1          | 5,4  | 0,17   | 0,25     | 0,36     |
| 560                                      | 630   | 0,26   | 0,35 | 4                                   | 5,4  | 4,4          | 5,9  | 0,2  | 0,29     | 0,41     |
| 630                                      | 710   | 0,3  | 0,4  | 4,6                                 | 6,2  | 5,1          | 6,8  | 0,21   | 0,31     | 0,45     |
| 710                                      | 800   | 0,34   | 0,45 | 5,3                                 | 7    | 5,8          | 7,6  | 0,23   | 0,35     | 0,51     |
| 800                                      | 900   | 0,37   | 0,5  | 5,7                                 | 7,8  | 6,3          | 8,5  | 0,27   | 0,39     | 0,57     |
| 900                                      | 1000  | 0,41   | 0,55 | 6,3                                 | 8,5  | 7            | 9,4  | 0,3  | 0,43     | 0,64     |
| 1000                                     | 1120  | 0,45   | 0,6  | 6,8                                 | 9    | 7,6          | 10,2 | 0,32   | 0,48     | 0,7      |
| 1120                                     | 1250  | 0,49   | 0,65 | 7,4                                 | 9,8  | 8,3          | 11   | 0,34   | 0,54     | 0,77     |
| 1250                                     | 1400  | 0,55   | 0,72 | 8,3                                 | 10,8 | 9,3          | 12,1 | 0,36   | 0,59     | 0,84     |
| 1400                                     | 1600  | 0,62   | 0,81 | 9,3                                 | 12,2 | 10,6         | 13,8 | 0,44   | 0,66     | 0,94     |
| 1600                                     | 1800  | 0,69   | 0,93 | 10,4                                | 14   | 11,7         | 15,8 | 0,48   | 0,73     | 1,02     |
| 1800                                     | 2000  | 0,77   | 1,04 | 11,6                                | 15,6 | 13,1         | 17,7 | 0,54   | 0,81     | 1,11     |
| 2000                                     | 2250  | 0,85   | 1,15 | 12,7                                | 17,2 | 14,5         | 19,5 | 0,6  | 0,95     | 1,55     |
| 2250                                     | 2500  | 0,95   | 1,28 | 14,3                                | 19,2 | 16,2         | 21,8 | 0,65   | 1,15     | 1,7      |

**Reduction in radial internal clearance and displacement distance on taper 1:30**

| Nominal bearing bore diameter |       | Reduction in radial internal clearance |      | Displacement distance on taper 1:30 |      |           |      | Control value for minimum radial internal clearance after mounting |       |       |
|-------------------------------|-------|--|------|-------------------------------------|------|-----------|------|--|-------|-------|
| d mm                          |       | mm                                     |      | Shaft mm                            |      | Sleeve mm |      | CN mm  | C3 mm | C4 mm |
| over                          | incl. | min.                                   | max. | min.                                | max. | min.      | max. | min.   | min.  | min.  |
| 160                           | 180   | 0,08                                   | 0,11 | 3,2                                 | 4,2  | 3,3       | 4,6  | 0,06   | 0,1   | 0,15  |
| 180                           | 200   | 0,09                                   | 0,13 | 3,5                                 | 4,5  | 3,6       | 5    | 0,07   | 0,1   | 0,16  |
| 200                           | 225   | 0,1                                    | 0,14 | 4                                   | 5,5  | 4,2       | 5,7  | 0,08   | 0,12  | 0,18  |
| 225                           | 250   | 0,11                                   | 0,15 | 4,2                                 | 6    | 4,6       | 6,2  | 0,09   | 0,13  | 0,2   |
| 250                           | 280   | 0,12                                   | 0,17 | 4,7                                 | 6,7  | 4,8       | 6,9  | 0,1  | 0,14  | 0,22  |
| 280                           | 315   | 0,13                                   | 0,19 | 5                                   | 7,5  | 5,2       | 7,7  | 0,11   | 0,15  | 0,24  |
| 315                           | 355   | 0,15                                   | 0,21 | 6                                   | 8,2  | 6,2       | 8,4  | 0,12   | 0,17  | 0,26  |
| 355                           | 400   | 0,17                                   | 0,23 | 6,5                                 | 9    | 6,8       | 9,2  | 0,13   | 0,19  | 0,29  |
| 400                           | 450   | 0,2                                    | 0,26 | 7,7                                 | 10   | 8         | 10,4 | 0,13   | 0,2   | 0,31  |
| 450                           | 500   | 0,21                                   | 0,28 | 8,2                                 | 11   | 8,4       | 11,2 | 0,16   | 0,23  | 0,35  |
| 500                           | 560   | 0,24                                   | 0,32 | 9,2                                 | 12,5 | 9,6       | 12,8 | 0,17   | 0,25  | 0,36  |
| 560                           | 630   | 0,26                                   | 0,35 | 10                                  | 13,5 | 10,4      | 14   | 0,2  | 0,29  | 0,41  |
| 630                           | 710   | 0,3                                    | 0,4  | 11,5                                | 15,5 | 12        | 16   | 0,21   | 0,31  | 0,45  |
| 710                           | 800   | 0,34                                   | 0,45 | 13,3                                | 17,5 | 13,6      | 18   | 0,23   | 0,35  | 0,51  |
| 800                           | 900   | 0,37                                   | 0,5  | 14,3                                | 19,5 | 14,8      | 20   | 0,27   | 0,39  | 0,57  |
| 900                           | 1000  | 0,41                                   | 0,55 | 15,8                                | 21   | 16,4      | 22   | 0,3  | 0,43  | 0,64  |
| 1000                          | 1120  | 0,45                                   | 0,6  | 17                                  | 23   | 18        | 24   | 0,32   | 0,48  | 0,7   |
| 1120                          | 1250  | 0,49                                   | 0,65 | 18,5                                | 25   | 19,6      | 26   | 0,34   | 0,54  | 0,77  |
| 1250                          | 1400  | 0,55                                   | 0,72 | 21                                  | 27   | 22,2      | 28,3 | 0,36   | 0,59  | 0,84  |
| 1400                          | 1600  | 0,62                                   | 0,81 | 23,6                                | 30,8 | 24,8      | 32,4 | 0,44   | 0,66  | 0,94  |
| 1600                          | 1800  | 0,69                                   | 0,93 | 26,2                                | 35,3 | 27,6      | 37,2 | 0,48   | 0,73  | 1,02  |
| 1800                          | 2000  | 0,77                                   | 1,04 | 29,3                                | 39,5 | 30,8      | 41,6 | 0,54   | 0,81  | 1,11  |
| 2000                          | 2250  | 0,85                                   | 1,15 | 32,4                                | 43,9 | 34        | 46   | 0,6  | 0,95  | 1,55  |
| 2250                          | 2500  | 0,95                                   | 1,28 | 36,2                                | 48,8 | 38        | 51,2 | 0,65   | 1,15  | 1,7   |



# Spherical roller bearings

## Accuracy

The main dimensions of the standard bearings conform to DIN 635-2. The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

## Tolerances for bearings to specification T41A and T41D

Restricted tolerance according to specification T41A (D), see following table. In bearings with a tapered bore, the reduced tolerance range applies to the outside diameter only.

### Tolerances

| Inner ring                          |       |  | Outer ring                     |       |  |
|-------------------------------------|-------|--|--------------------------------|-------|--|
| Nominal bearing bore diameter<br>mm |       | Deviation<br>$\Delta_{dmp}$<br>$\mu\text{m}$ | Nominal outside diameter<br>mm |       | Deviation<br>$\Delta_{Dmp}$<br>$\mu\text{m}$ |
| over                                | incl. |  | over                           | incl. |  |
| 120                                 | 180   | 0 -15  | 315                            | 400   | -13 -28                                      |
| 180                                 | 250   | 0 -18  | 400                            | 500   | -13 -30                                      |
| 250                                 | 315   | 0 -21  | 500                            | 630   | -15 -35                                      |

## Radial internal clearance of bearings with cylindrical bore

The radial internal clearance of standard bearings corresponds to internal clearance group CN to DIN 620-4.

### Radial internal clearance

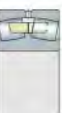
| Bore<br>d<br>mm |       | Radial internal clearance |      |                     |      |                     |      |                     |      |
|-----------------|-------|---------------------------|------|---------------------|------|---------------------|------|---------------------|------|
|                 |       | C2<br>$\mu\text{m}$       |      | CN<br>$\mu\text{m}$ |      | C3<br>$\mu\text{m}$ |      | C4<br>$\mu\text{m}$ |      |
| over            | incl. | min.                      | max. | min.                | max. | min.                | max. | min.                | max. |
| 140             | 160   | 60                        | 110  | 110                 | 170  | 170                 | 220  | 220                 | 280  |
| 160             | 180   | 65                        | 120  | 120                 | 180  | 180                 | 240  | 240                 | 310  |
| 180             | 200   | 70                        | 130  | 130                 | 200  | 200                 | 260  | 260                 | 340  |
| 200             | 225   | 80                        | 140  | 140                 | 220  | 220                 | 290  | 290                 | 380  |
| 225             | 250   | 90                        | 150  | 150                 | 240  | 240                 | 320  | 320                 | 420  |
| 250             | 280   | 100                       | 170  | 170                 | 260  | 260                 | 350  | 350                 | 460  |
| 280             | 315   | 110                       | 190  | 190                 | 280  | 280                 | 370  | 370                 | 500  |
| 315             | 355   | 120                       | 200  | 200                 | 310  | 310                 | 410  | 410                 | 550  |
| 355             | 400   | 130                       | 220  | 220                 | 340  | 340                 | 450  | 450                 | 600  |
| 400             | 450   | 140                       | 240  | 240                 | 370  | 370                 | 500  | 500                 | 660  |
| 450             | 500   | 140                       | 260  | 260                 | 410  | 410                 | 550  | 550                 | 720  |
| 500             | 560   | 150                       | 280  | 280                 | 440  | 440                 | 600  | 600                 | 780  |
| 560             | 630   | 170                       | 310  | 310                 | 480  | 480                 | 650  | 650                 | 850  |
| 630             | 710   | 190                       | 350  | 350                 | 530  | 530                 | 700  | 700                 | 920  |
| 710             | 800   | 210                       | 390  | 390                 | 580  | 580                 | 770  | 770                 | 1010 |
| 800             | 900   | 230                       | 430  | 430                 | 650  | 650                 | 860  | 860                 | 1120 |
| 900             | 1000  | 260                       | 480  | 480                 | 710  | 710                 | 930  | 930                 | 1220 |
| 1000            | 1120  | 290                       | 530  | 530                 | 770  | 770                 | 1050 | 1050                | 1430 |
| 1120            | 1250  | 320                       | 580  | 580                 | 840  | 840                 | 1140 | 1140                | 1560 |
| 1250            | 1400  | 350                       | 630  | 630                 | 910  | 910                 | 1240 | 1240                | 1700 |
| 1400            | 1600  | 380                       | 700  | 700                 | 1020 | 1020                | 1390 | 1390                | 1890 |
| 1600            | 1800  | 420                       | 780  | 780                 | 1140 | 1140                | 1550 | 1550                | 2090 |
| 1800            | 2000  | 460                       | 860  | 860                 | 1260 | 1260                | 1710 | 1710                | 2300 |
| 2000            | 2250  | 500                       | 950  | 950                 | 1400 | 1400                | 1900 | 1900                | 2540 |
| 2250            | 2500  | 550                       | 1050 | 1050                | 1550 | 1550                | 2100 | 2100                | 2790 |

## Radial internal clearance of bearings with tapered bore

The radial internal clearance of standard bearings corresponds to internal clearance group CN to DIN 620-4.

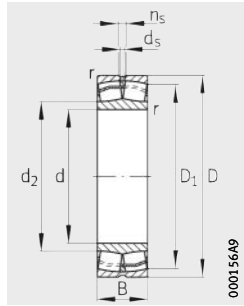
### Radial internal clearance

| Bore    |       | Radial internal clearance |      |          |      |          |      |          |      |
|---------|-------|---------------------------|------|----------|------|----------|------|----------|------|
| d<br>mm |       | C2<br>μm                  |      | CN<br>μm |      | C3<br>μm |      | C4<br>μm |      |
| over    | incl. | min.                      | max. | min.     | max. | min.     | max. | min.     | max. |
| 140     | 160   | 90                        | 130  | 130      | 180  | 180      | 230  | 230      | 300  |
| 160     | 180   | 100                       | 140  | 140      | 200  | 200      | 260  | 260      | 340  |
| 180     | 200   | 110                       | 160  | 160      | 220  | 220      | 290  | 290      | 370  |
| 200     | 225   | 120                       | 180  | 180      | 250  | 250      | 320  | 320      | 410  |
| 225     | 250   | 140                       | 200  | 200      | 270  | 270      | 350  | 350      | 450  |
| 250     | 280   | 150                       | 220  | 220      | 300  | 300      | 390  | 390      | 490  |
| 280     | 315   | 170                       | 240  | 240      | 330  | 330      | 430  | 430      | 540  |
| 315     | 355   | 190                       | 270  | 270      | 360  | 360      | 470  | 470      | 590  |
| 355     | 400   | 210                       | 300  | 300      | 400  | 400      | 520  | 520      | 650  |
| 400     | 450   | 230                       | 330  | 330      | 440  | 440      | 570  | 570      | 720  |
| 450     | 500   | 260                       | 370  | 370      | 490  | 490      | 630  | 630      | 790  |
| 500     | 560   | 290                       | 410  | 410      | 540  | 540      | 680  | 680      | 870  |
| 560     | 630   | 320                       | 460  | 460      | 600  | 600      | 760  | 760      | 980  |
| 630     | 710   | 350                       | 510  | 510      | 670  | 670      | 850  | 850      | 1090 |
| 710     | 800   | 390                       | 570  | 570      | 750  | 750      | 960  | 960      | 1220 |
| 800     | 900   | 440                       | 640  | 640      | 840  | 840      | 1070 | 1070     | 1370 |
| 900     | 1000  | 490                       | 710  | 710      | 930  | 930      | 1190 | 1190     | 1520 |
| 1000    | 1120  | 540                       | 780  | 780      | 1020 | 1020     | 1300 | 1300     | 1650 |
| 1120    | 1250  | 600                       | 860  | 860      | 1120 | 1120     | 1420 | 1420     | 1800 |
| 1250    | 1400  | 660                       | 940  | 940      | 1220 | 1220     | 1550 | 1550     | 1960 |
| 1400    | 1600  | 740                       | 1060 | 1060     | 1380 | 1380     | 1750 | 1750     | 2200 |
| 1600    | 1800  | 820                       | 1180 | 1180     | 1540 | 1540     | 1950 | 1950     | 2500 |
| 1800    | 2000  | 910                       | 1310 | 1310     | 1710 | 1710     | 2150 | 2150     | 2750 |
| 2000    | 2250  | 1000                      | 1450 | 1450     | 1900 | 1900     | 2400 | 2400     | 3050 |
| 2250    | 2500  | 1100                      | 1600 | 1600     | 2100 | 2100     | 2650 | 2650     | 3350 |

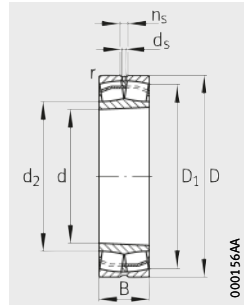


# Spherical roller bearings

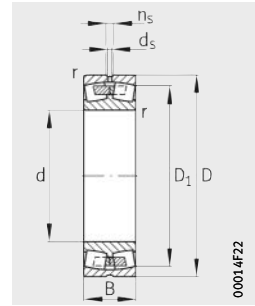
Cylindrical or tapered bore



Design 1  
Cylindrical bore



Tapered bore  
K = taper 1:12  
K30 = taper 1:30

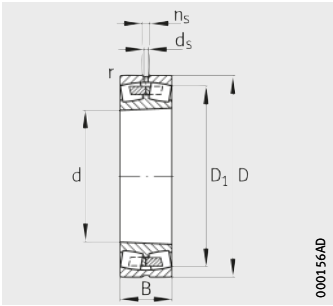


Design 2  
With central rib  
Cylindrical bore

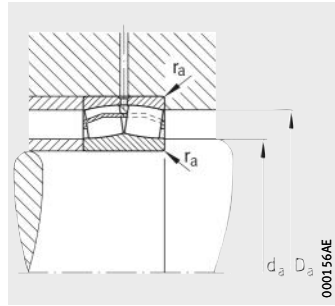
Dimension table - Dimensions in mm

| Designation     | X-life | Design          | Mass<br>m<br>≈ kg | Dimensions |     |     |           |                     |                     |                |                |
|-----------------|--------|-----------------|-------------------|------------|-----|-----|-----------|---------------------|---------------------|----------------|----------------|
|                 |        |                 |                   | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>2</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 22330-E1-K      | XL     | 1               | 40,9              | 150        | 320 | 108 | 4         | 273,2               | 185,3               | 9,5            | 17,7           |
| 22330-E1-K-T41A | XL     | 1               | 40,9              | 150        | 320 | 108 | 4         | 273,2               | 185,3               | 9,5            | 17,7           |
| 22330-E1        | XL     | 1               | 42,2              | 150        | 320 | 108 | 4         | 273,2               | 185,3               | 9,5            | 17,7           |
| 22330-E1-T41D   | XL     | 1               | 42,2              | 150        | 320 | 108 | 4         | 273,2               | 185,3               | 9,5            | 17,7           |
| 23330-A-MA-T41A | -      | 2               | 49,8              | 150        | 320 | 128 | 4         | 264,5               | -                   | 8              | 15             |
| 22332-K-MB      | -      | 2               | 50,1              | 160        | 340 | 114 | 4         | 288,3               | -                   | 9,5            | 17,7           |
| 22332-MB        | -      | 2               | 51,1              | 160        | 340 | 114 | 4         | 288,3               | -                   | 9,5            | 17,7           |
| 22332-A-MA-T41A | -      | 2               | 52,4              | 160        | 340 | 114 | 4         | 288,3               | -                   | 9,5            | 17,7           |
| 23332-A-MA-T41A | -      | 2               | 61,3              | 160        | 340 | 136 | 4         | 280,6               | -                   | 9,5            | 17,7           |
| 22334-K-MB      | -      | 2               | 58,4              | 170        | 360 | 120 | 4         | 304,2               | -                   | 9,5            | 17,7           |
| 22334-A-MA-T41A | -      | 2               | 59,5              | 170        | 360 | 120 | 4         | 304,2               | -                   | 9,5            | 17,7           |
| 22334-MB        | -      | 2               | 59,5              | 170        | 360 | 120 | 4         | 304,2               | -                   | 9,5            | 17,7           |
| 23334-A-MA-T41A | -      | 2               | 71,9              | 170        | 360 | 140 | 4         | 300,7               | -                   | 9,5            | 17,7           |
| 22236-E1-K      | XL     | 1               | 28,5              | 180        | 320 | 86  | 4         | 285,9               | 211,3               | 9,5            | 17,7           |
| 22236-E1        | XL     | 1               | 29,2              | 180        | 320 | 86  | 4         | 285,9               | 211,3               | 9,5            | 17,7           |
| 23236-E1A-K-M   | XL     | 1               | 37                | 180        | 320 | 112 | 4         | 277,3               | -                   | 8              | 15             |
| 23236-E1A-M     | XL     | 1               | 38,5              | 180        | 320 | 112 | 4         | 277,3               | -                   | 8              | 15             |
| 22236-K-MB      | -      | 2               | 66,7              | 180        | 380 | 126 | 4         | 323,4               | -                   | 12,5           | 23,5           |
| 22236-MB        | -      | 2               | 69                | 180        | 380 | 126 | 4         | 323,4               | -                   | 12,5           | 23,5           |
| 22236-A-MA-T41A | -      | 2               | 71,7              | 180        | 380 | 126 | 4         | 323,4               | -                   | 12,5           | 23,5           |
| 23336-A-MA-T41A | -      | 2               | 86,4              | 180        | 380 | 150 | 4         | 315,9               | -                   | 9,5            | 17,7           |
| 23138-E1A-K-M   | XL     | 1               | 32,4              | 190        | 320 | 104 | 3         | 281,6               | -                   | 8              | 15             |
| 23138-E1A-M     | XL     | 1               | 33,9              | 190        | 320 | 104 | 3         | 281,6               | -                   | 8              | 15             |
| 24138-E1        | XL     | 1 <sup>1)</sup> | 41,5              | 190        | 320 | 128 | 3         | 271,2               | 217,4               | 6,3            | 12,2           |
| 24138-E1-K30    | XL     | 1 <sup>1)</sup> | 41,5              | 190        | 320 | 128 | 3         | 271,2               | 217,4               | 6,3            | 12,2           |
| 22238-K-MB      | -      | 2               | 36,2              | 190        | 340 | 92  | 4         | 296                 | -                   | 9,5            | 17,7           |
| 22238-MB        | -      | 2               | 37                | 190        | 340 | 92  | 4         | 296                 | -                   | 9,5            | 17,7           |
| 23238-B-K-MB    | -      | 2               | 46                | 190        | 340 | 120 | 4         | 291,2               | -                   | 9,5            | 17,7           |
| 23238-B-MB      | -      | 2               | 48,4              | 190        | 340 | 120 | 4         | 291,2               | -                   | 9,5            | 17,7           |
| 22238-K-MB      | -      | 2               | 77,3              | 190        | 400 | 132 | 5         | 338,2               | -                   | 12,5           | 23,5           |
| 22238-A-MA-T41A | -      | 2               | 80,5              | 190        | 400 | 132 | 5         | 338,2               | -                   | 12,5           | 23,5           |
| 22238-MB        | -      | 2               | 80,5              | 190        | 400 | 132 | 5         | 338,2               | -                   | 12,5           | 23,5           |
| 23338-A-MA-T41A | -      | 2               | 97,1              | 190        | 400 | 155 | 5         | 331,6               | -                   | 9,5            | 17,7           |

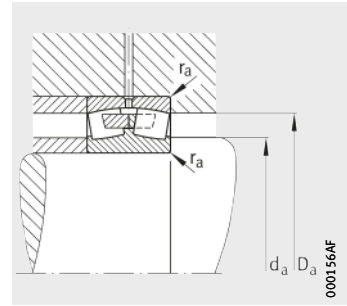
<sup>1)</sup> Cage guidance on inner ring central rib.



With central rib  
K = taper 1:12  
K30 = taper 1:30



Design 1  
Mounting dimensions



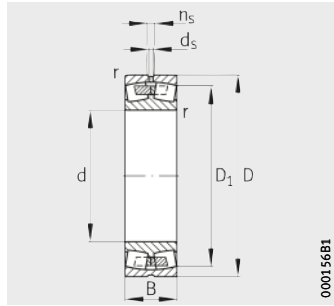
Design 2  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 167                 | 303           | 3             | 1 640               | 1 850                   | 0,33                | 2,02  | 3     | 1,97  | 148                                  | 2 200  | 1 520   |
| 167                 | 303           | 3             | 1 640               | 1 850                   | 0,33                | 2,02  | 3     | 1,97  | 148                                  | 2 200  | 1 520   |
| 167                 | 303           | 3             | 1 640               | 1 850                   | 0,33                | 2,02  | 3     | 1,97  | 148                                  | 2 200  | 1 520   |
| 167                 | 303           | 3             | 1 640               | 1 850                   | 0,33                | 2,02  | 3     | 1,97  | 148                                  | 2 200  | 1 520   |
| 167                 | 303           | 3             | 1 500               | 2 120                   | 0,44                | 1,52  | 2,26  | 1,49  | 135                                  | 2 000  | –   |
| 177                 | 323           | 3             | 1 430               | 1 900                   | 0,37                | 1,8   | 2,69  | 1,76  | 121                                  | 2 000  | 1 500   |
| 177                 | 323           | 3             | 1 430               | 1 900                   | 0,37                | 1,8   | 2,69  | 1,76  | 121                                  | 2 000  | 1 500   |
| 177                 | 323           | 3             | 1 430               | 1 900                   | 0,37                | 1,8   | 2,69  | 1,76  | 136                                  | 2 000  | 1 500   |
| 177                 | 323           | 3             | 1 660               | 2 320                   | 0,44                | 1,54  | 2,3   | 1,51  | 152                                  | 2 000  | –   |
| 187                 | 343           | 3             | 1 600               | 2 120                   | 0,37                | 1,83  | 2,72  | 1,79  | 134                                  | 1 800  | 1 380   |
| 187                 | 343           | 3             | 1 600               | 2 120                   | 0,37                | 1,83  | 2,72  | 1,79  | 144                                  | 1 800  | 1 380   |
| 187                 | 343           | 3             | 1 600               | 2 120                   | 0,37                | 1,83  | 2,72  | 1,79  | 134                                  | 1 800  | 1 380   |
| 187                 | 343           | 3             | 1 800               | 2 600                   | 0,43                | 1,57  | 2,34  | 1,53  | 160                                  | 1 700  | –   |
| 197                 | 303           | 3             | 1 360               | 1 680                   | 0,25                | 2,71  | 4,04  | 2,65  | 148                                  | 2 400  | 1 670   |
| 197                 | 303           | 3             | 1 360               | 1 680                   | 0,25                | 2,71  | 4,04  | 2,65  | 148                                  | 2 400  | 1 670   |
| 197                 | 303           | 3             | 1 710               | 2 340                   | 0,33                | 2,07  | 3,09  | 2,03  | 173                                  | 2 000  | 1 090   |
| 197                 | 303           | 3             | 1 710               | 2 340                   | 0,33                | 2,07  | 3,09  | 2,03  | 173                                  | 2 000  | 1 090   |
| 197                 | 363           | 3             | 1 760               | 2 360                   | 0,37                | 1,83  | 2,72  | 1,79  | 209                                  | 1 500  | 1 270   |
| 197                 | 363           | 3             | 1 760               | 2 360                   | 0,37                | 1,83  | 2,72  | 1,79  | 209                                  | 1 500  | 1 270   |
| 197                 | 363           | 3             | 1 760               | 2 360                   | 0,37                | 1,83  | 2,72  | 1,79  | 234                                  | 1 500  | 1 270   |
| 197                 | 363           | 3             | 2 040               | 2 900                   | 0,44                | 1,54  | 2,29  | 1,5   | 260                                  | 1 500  | –   |
| 204                 | 306           | 2,5           | 1 610               | 2 220                   | 0,3                 | 2,28  | 3,39  | 2,23  | 218                                  | 2 000  | 1 260   |
| 204                 | 306           | 2,5           | 1 610               | 2 220                   | 0,3                 | 2,28  | 3,39  | 2,23  | 218                                  | 2 000  | 1 260   |
| 204                 | 306           | 2,5           | 1 670               | 2 500                   | 0,37                | 1,82  | 2,7   | 1,78  | 226                                  | 1 400  | 880   |
| 204                 | 306           | 2,5           | 1 670               | 2 500                   | 0,37                | 1,82  | 2,7   | 1,78  | 226                                  | 1 400  | 880   |
| 207                 | 323           | 3             | 1 200               | 1 830                   | 0,28                | 2,39  | 3,56  | 2,34  | 122                                  | 1 800  | 1 600   |
| 207                 | 323           | 3             | 1 200               | 1 830                   | 0,28                | 2,39  | 3,56  | 2,34  | 122                                  | 1 800  | 1 600   |
| 207                 | 323           | 3             | 1 560               | 2 600                   | 0,36                | 1,86  | 2,77  | 1,82  | 156                                  | 1 700  | 1 020   |
| 207                 | 323           | 3             | 1 560               | 2 600                   | 0,36                | 1,86  | 2,77  | 1,82  | 156                                  | 1 700  | 1 020   |
| 210                 | 380           | 4             | 1 860               | 2 500                   | 0,37                | 1,83  | 2,72  | 1,79  | 213                                  | 1 500  | 1 220   |
| 210                 | 380           | 4             | 1 860               | 2 500                   | 0,37                | 1,83  | 2,72  | 1,79  | 173                                  | 1 500  | 1 220   |
| 210                 | 380           | 4             | 1 860               | 2 500                   | 0,37                | 1,83  | 2,72  | 1,79  | 213                                  | 1 500  | 1 220   |
| 210                 | 380           | 4             | 2 200               | 3 200                   | 0,43                | 1,57  | 2,34  | 1,53  | 223                                  | 1 400  | –   |

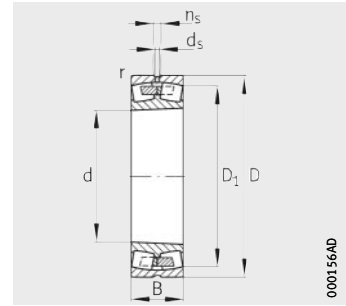


# Spherical roller bearings

Cylindrical or tapered bore  
Open or sealed



Design 2  
With central rib  
Cylindrical bore

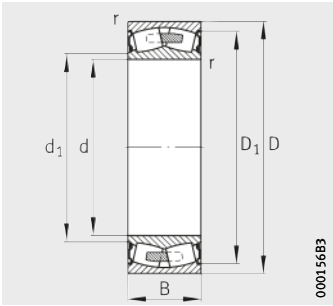


With central rib  
K = taper 1:12  
K30 = taper 1:30

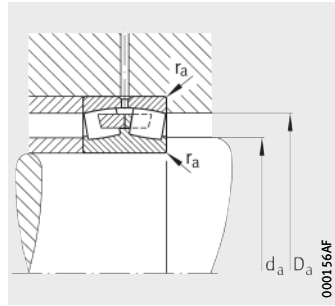
Dimension table (continued) · Dimensions in mm

| Designation     | Design | Mass<br>m<br>≈kg | Dimensions |     |     |     |                |                |                |
|-----------------|--------|------------------|------------|-----|-----|-----|----------------|----------------|----------------|
|                 |        |                  | d          | D   | B   | r   | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| F-803046.PRL    | 4      | 20               | 200        | 340 | 112 | 3   | 293,3          | –              | –              |
| 23140-B-K-MB    | 2      | 41,7             | 200        | 340 | 112 | 3   | 293,3          | 9,5            | 17,7           |
| 23140-B-MB      | 2      | 43               | 200        | 340 | 112 | 4   | 293,3          | 9,5            | 17,7           |
| F-803040.PRL    | 4      | 52,5             | 200        | 340 | 140 | 3   | 285,9          | –              | –              |
| F-803047.PRL    | 4      | 52,5             | 200        | 340 | 140 | 3   | 285,9          | –              | –              |
| 24140-B-K30     | 2      | 51,6             | 200        | 340 | 140 | 3   | 285,9          | 6,3            | 12,2           |
| 24140-B         | 2      | 52,4             | 200        | 340 | 140 | 3   | 285,9          | 6,3            | 12,2           |
| 22240-B-K-MB    | 2      | 42,3             | 200        | 360 | 98  | 4   | 312            | 9,5            | 17,7           |
| 22240-B-MB      | 2      | 44,2             | 200        | 360 | 98  | 4   | 312            | 9,5            | 17,7           |
| 23240-B-K-MB    | 2      | 55,8             | 200        | 360 | 128 | 4   | 307,5          | 9,5            | 17,7           |
| 23240-B-MB      | 2      | 60,5             | 200        | 360 | 128 | 4   | 307,5          | 9,5            | 17,7           |
| 22340-K-MB      | 2      | 89,5             | 200        | 420 | 138 | 5   | 357,4          | 12,5           | 23,5           |
| 22340-MB        | 2      | 91               | 200        | 420 | 138 | 5   | 357,4          | 12,5           | 23,5           |
| 22340-A-MA-T41A | 2      | 92,4             | 200        | 420 | 138 | 5   | 357,4          | 12,5           | 23,5           |
| 23340-A-MA-T41A | 2      | 108              | 200        | 420 | 165 | 5   | 350,2          | 9,5            | 17,7           |
| 23044-K-MB      | 2      | 30,3             | 220        | 340 | 90  | 3   | 301,8          | 8              | 15             |
| 23044-MB        | 2      | 31,7             | 220        | 340 | 90  | 3   | 301,8          | 8              | 15             |
| 24044-B-K30-MB  | 2      | 38,9             | 220        | 340 | 118 | 3   | 297,4          | 6,3            | 12,2           |
| 24044-B-MB      | 2      | 39,5             | 220        | 340 | 118 | 3   | 297,4          | 6,3            | 12,2           |
| 23144-B-K-MB    | 2      | 52               | 220        | 370 | 120 | 4   | 319,2          | 9,5            | 17,7           |
| 23144-B-MB      | 2      | 55,2             | 220        | 370 | 120 | 4   | 319,2          | 9,5            | 17,7           |
| 24144-B-K30     | 2      | 64,4             | 220        | 370 | 150 | 4   | 311,7          | 6,3            | 12,2           |
| 24144-B         | 2      | 65,6             | 220        | 370 | 150 | 4   | 311,7          | 6,3            | 12,2           |
| 22244-B-K-MB    | 2      | 59,6             | 220        | 400 | 108 | 4   | 348,7          | 9,5            | 17,7           |
| 22244-B-MB      | 2      | 61,5             | 220        | 400 | 108 | 4   | 348,7          | 9,5            | 17,7           |
| 23244-K-MB      | 2      | 79               | 220        | 400 | 144 | 4   | 337,6          | 9,5            | 17,7           |
| 23244-MB        | 2      | 81,1             | 220        | 400 | 144 | 4   | 337,6          | 9,5            | 17,7           |
| F-803054.PRL    | 4      | 79,9             | 220        | 400 | 144 | 4   | 341            | –              | –              |
| 22344-K-MB      | 2      | 114              | 220        | 460 | 145 | 5   | 391,2          | 12,5           | 23,5           |
| 22344-A-MA-T41A | 2      | 119              | 220        | 460 | 145 | 5   | 391,2          | 12,5           | 23,5           |
| 22344-MB        | 2      | 119              | 220        | 460 | 145 | 5   | 391,2          | 12,5           | 23,5           |
| 23344-A-MA-T41A | 2      | 151              | 220        | 460 | 180 | 5   | 382,8          | 9,5            | 17,7           |
| 23948-K-MB      | 2      | 13,4             | 240        | 320 | 60  | 2,1 | 297,8          | 6,3            | 12,2           |
| 23948-MB        | 2      | 13,9             | 240        | 320 | 60  | 2,1 | 297,8          | 6,3            | 12,2           |
| 24948-B-K30-MB  | 2      | 18,6             | 240        | 320 | 80  | 2,1 | 294,3          | 4,8            | 9,5            |
| 24948-B-MB      | 2      | 18,6             | 240        | 320 | 80  | 2,1 | 294,3          | 4,8            | 9,5            |

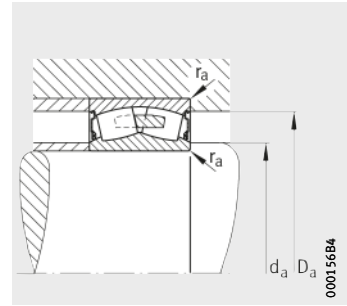




Design 4  
Cylindrical bore  
Sealed

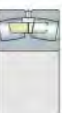


Design 2  
Mounting dimensions



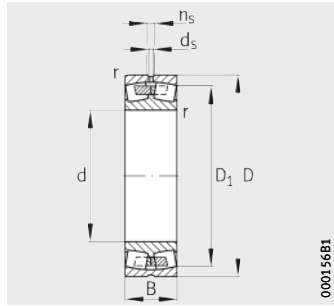
Design 4  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 214                 | 326           | 2,5           | 1 290               | 2 200                   | 0,28                | 2,43  | 3,61  | 2,37  | 138                                  | 420  | –   |
| 214                 | 326           | 2,5           | 1 320               | 2 280                   | 0,35                | 1,95  | 2,9   | 1,91  | 131                                  | 1 700  | 1 230   |
| 214                 | 326           | 2,5           | 1 320               | 2 280                   | 0,35                | 1,95  | 2,9   | 1,91  | 131                                  | 1 700  | 1 230   |
| 214                 | 326           | 2,5           | 1 530               | 2 700                   | 0,33                | 2,03  | 3,02  | 1,98  | 178                                  | 280  | –   |
| 214                 | 326           | 2,5           | 1 530               | 2 700                   | 0,33                | 2,03  | 3,02  | 1,98  | 178                                  | 280  | –   |
| 214                 | 326           | 2,5           | 1 700               | 3 000                   | 0,42                | 1,62  | 2,42  | 1,59  | 190                                  | 1 400  | 810   |
| 214                 | 326           | 2,5           | 1 700               | 3 000                   | 0,42                | 1,62  | 2,42  | 1,59  | 190                                  | 1 400  | 810   |
| 217                 | 343           | 3             | 1 320               | 2 000                   | 0,29                | 2,35  | 3,5   | 2,3   | 123                                  | 1 700  | 1 530   |
| 217                 | 343           | 3             | 1 320               | 2 000                   | 0,29                | 2,35  | 3,5   | 2,3   | 123                                  | 1 700  | 1 530   |
| 217                 | 343           | 3             | 1 660               | 2 750                   | 0,37                | 1,83  | 2,72  | 1,79  | 163                                  | 1 500  | 980   |
| 217                 | 343           | 3             | 1 660               | 2 750                   | 0,37                | 1,83  | 2,72  | 1,79  | 163                                  | 1 500  | 980   |
| 220                 | 400           | 4             | 2 080               | 2 800                   | 0,36                | 1,87  | 2,79  | 1,83  | 189                                  | 1 400  | 1 120   |
| 220                 | 400           | 4             | 2 080               | 2 800                   | 0,36                | 1,87  | 2,79  | 1,83  | 189                                  | 1 400  | 1 120   |
| 220                 | 400           | 4             | 2 080               | 2 800                   | 0,36                | 1,87  | 2,79  | 1,83  | 189                                  | 1 400  | 1 120   |
| 220                 | 400           | 4             | 2 450               | 3 600                   | 0,43                | 1,55  | 2,31  | 1,52  | 238                                  | 1 300  | –   |
| 232,4               | 327,6         | 2,5           | 1 100               | 2 000                   | 0,26                | 2,55  | 3,8   | 2,5   | 132                                  | 1 700  | 1 440   |
| 232,4               | 327,6         | 2,5           | 1 100               | 2 000                   | 0,26                | 2,55  | 3,8   | 2,5   | 132                                  | 1 700  | 1 440   |
| 232,4               | 327,6         | 2,5           | 1 400               | 2 700                   | 0,34                | 1,96  | 2,92  | 1,92  | 139                                  | 1 300  | 1 070   |
| 232,4               | 327,6         | 2,5           | 1 400               | 2 700                   | 0,34                | 1,96  | 2,92  | 1,92  | 139                                  | 1 300  | 1 070   |
| 237                 | 353           | 3             | 1 630               | 2 900                   | 0,33                | 2,03  | 3,02  | 1,98  | 165                                  | 1 400  | 1 060   |
| 237                 | 353           | 3             | 1 630               | 2 900                   | 0,33                | 2,03  | 3,02  | 1,98  | 165                                  | 1 400  | 1 060   |
| 237                 | 353           | 3             | 1 900               | 3 450                   | 0,41                | 1,63  | 2,43  | 1,6   | 197                                  | 1 300  | 720   |
| 237                 | 353           | 3             | 1 900               | 3 450                   | 0,41                | 1,63  | 2,43  | 1,6   | 197                                  | 1 300  | 720   |
| 237                 | 383           | 3             | 1 630               | 2 450                   | 0,29                | 2,35  | 3,5   | 2,3   | 153                                  | 1 400  | 1 300   |
| 237                 | 383           | 3             | 1 630               | 2 450                   | 0,29                | 2,35  | 3,5   | 2,3   | 153                                  | 1 400  | 1 300   |
| 237                 | 383           | 3             | 2 040               | 3 450                   | 0,37                | 1,83  | 2,72  | 1,79  | 181                                  | 1 400  | 850   |
| 237                 | 383           | 3             | 2 040               | 3 450                   | 0,37                | 1,83  | 2,72  | 1,79  | 181                                  | 1 400  | 850   |
| 237                 | 383           | 3             | 2 080               | 3 450                   | 0,33                | 2,06  | 3,06  | 2,01  | 182                                  | 350  | –   |
| 240                 | 440           | 4             | 2 320               | 3 350                   | 0,35                | 1,95  | 2,9   | 1,91  | 217                                  | 1 300  | 970   |
| 240                 | 440           | 4             | 2 320               | 3 350                   | 0,35                | 1,95  | 2,9   | 1,91  | 217                                  | 1 300  | 970   |
| 240                 | 440           | 4             | 2 320               | 3 350                   | 0,35                | 1,95  | 2,9   | 1,91  | 217                                  | 1 300  | 970   |
| 240                 | 440           | 4             | 2 850               | 4 250                   | 0,43                | 1,56  | 2,32  | 1,53  | 240                                  | 1 300  | –   |
| 250,2               | 309,8         | 2,1           | 640                 | 1 370                   | 0,17                | 4,05  | 6,04  | 3,96  | 93                                   | 1 500  | 1 310   |
| 250,2               | 309,8         | 2,1           | 640                 | 1 370                   | 0,17                | 4,05  | 6,04  | 3,96  | 93                                   | 1 500  | 1 310   |
| 250,2               | 309,8         | 2,1           | 780                 | 1 700                   | 0,23                | 2,92  | 4,35  | 2,86  | 162                                  | 1 300  | –   |
| 250,2               | 309,8         | 2,1           | 780                 | 1 700                   | 0,23                | 2,92  | 4,35  | 2,86  | 162                                  | 1 300  | –   |

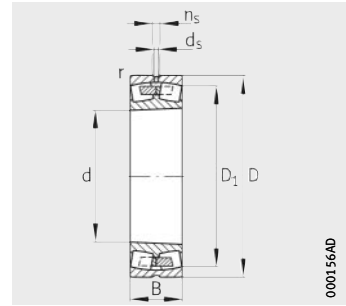


# Spherical roller bearings

Cylindrical or tapered bore  
Open or sealed



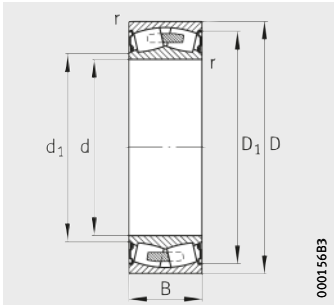
Design 2  
With central rib  
Cylindrical bore



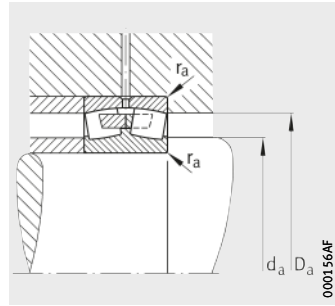
With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

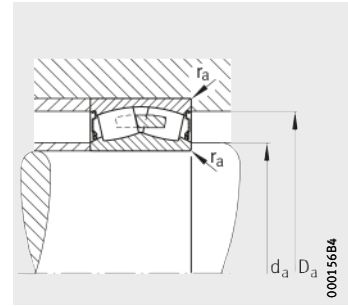
| Designation            | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |           |                     |                |                |
|------------------------|--------|-------------------|------------|-----|-----|-----------|---------------------|----------------|----------------|
|                        |        |                   | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| <b>23048-K-MB</b>      | 2      | 31,9              | <b>240</b> | 360 | 92  | 3         | 322,1               | 8              | 15             |
| <b>23048-MB</b>        | 2      | 34,4              | <b>240</b> | 360 | 92  | 3         | 322,1               | 8              | 15             |
| <b>F-803070.PRL</b>    | 4      | 42                | <b>240</b> | 360 | 118 | 3         | 318,9               | –              | –              |
| <b>24048-B-K30-MB</b>  | 2      | 43,2              | <b>240</b> | 360 | 118 | 3         | 318,9               | 6,3            | 12,2           |
| <b>24048-B-MB</b>      | 2      | 43,6              | <b>240</b> | 360 | 118 | 3         | 318,9               | 6,3            | 12,2           |
| <b>23148-B-K-MB</b>    | 2      | 65,3              | <b>240</b> | 400 | 128 | 4         | 346,2               | 9,5            | 17,7           |
| <b>23148-B-MB</b>      | 2      | 67,3              | <b>240</b> | 400 | 128 | 4         | 346,2               | 9,5            | 17,7           |
| <b>24148-B-K30</b>     | 2      | 78,7              | <b>240</b> | 400 | 160 | 4         | 338                 | 6,3            | 12,2           |
| <b>24148-B</b>         | 2      | 80,7              | <b>240</b> | 400 | 160 | 4         | 338                 | 6,3            | 12,2           |
| <b>22248-B-K-MB</b>    | 2      | 81,2              | <b>240</b> | 440 | 120 | 4         | 380,7               | 12,5           | 23,5           |
| <b>22248-B-MB</b>      | 2      | 83,4              | <b>240</b> | 440 | 120 | 4         | 380,7               | 12,5           | 23,5           |
| <b>23248-B-K-MB</b>    | 2      | 105               | <b>240</b> | 440 | 160 | 4         | 371                 | 12,5           | 23,5           |
| <b>23248-B-MB</b>      | 2      | 110               | <b>240</b> | 440 | 160 | 4         | 371                 | 12,5           | 23,5           |
| <b>22348-K-MB</b>      | 2      | 145               | <b>240</b> | 500 | 155 | 5         | 420                 | 12,5           | 23,5           |
| <b>22348-MB</b>        | 2      | 151               | <b>240</b> | 500 | 155 | 5         | 420                 | 12,5           | 23,5           |
| <b>23348-A-MA-T41A</b> | 2      | 187               | <b>240</b> | 500 | 195 | 5         | 416,7               | 12,5           | 23,5           |
| <b>23852-B-K-MB</b>    | 2      | 8,28              | <b>260</b> | 320 | 45  | 2         | 303,2               | 3,2            | 6,5            |
| <b>23852-B-MB</b>      | 2      | 8,28              | <b>260</b> | 320 | 45  | 2         | 303,2               | 3,2            | 6,5            |
| <b>24852-B-K30-MB</b>  | 2      | 11,4              | <b>260</b> | 320 | 60  | 2         | 301,8               | 3,2            | 6,5            |
| <b>24852-B-MB</b>      | 2      | 11,4              | <b>260</b> | 320 | 60  | 2         | 301,8               | 3,2            | 6,5            |
| <b>23952-K-MB</b>      | 2      | 22,4              | <b>260</b> | 360 | 75  | 2,1       | 330,5               | 8              | 15             |
| <b>23952-MB</b>        | 2      | 24,1              | <b>260</b> | 360 | 75  | 2,1       | 330,5               | 8              | 15             |
| <b>24952-B-K30-MB</b>  | 2      | 31,7              | <b>260</b> | 360 | 100 | 2,1       | 328,1               | 4,8            | 9,5            |
| <b>24952-B-MB</b>      | 2      | 31,7              | <b>260</b> | 360 | 100 | 2,1       | 328,1               | 4,8            | 9,5            |
| <b>23052-K-MB</b>      | 2      | 46,2              | <b>260</b> | 400 | 104 | 4         | 357,2               | 9,5            | 17,7           |
| <b>23052-MB</b>        | 2      | 49,3              | <b>260</b> | 400 | 104 | 4         | 357,2               | 9,5            | 17,7           |
| <b>24052-B-K30-MB</b>  | 2      | 64,5              | <b>260</b> | 400 | 140 | 4         | 349,1               | 6,3            | 12,2           |
| <b>24052-B-MB</b>      | 2      | 67,2              | <b>260</b> | 400 | 140 | 4         | 349,1               | 6,3            | 12,2           |
| <b>23152-K-MB</b>      | 2      | 89,6              | <b>260</b> | 440 | 144 | 4         | 379,7               | 9,5            | 17,7           |
| <b>23152-MB</b>        | 2      | 92,5              | <b>260</b> | 440 | 144 | 4         | 379,7               | 9,5            | 17,7           |
| <b>24152-B-K30</b>     | 2      | 112               | <b>260</b> | 440 | 180 | 4         | 370,3               | 8              | 15             |
| <b>24152-B</b>         | 2      | 114               | <b>260</b> | 440 | 180 | 4         | 370,3               | 8              | 15             |
| <b>F-803064.PRL</b>    | 4      | 113               | <b>260</b> | 440 | 180 | 4         | 368,4               | –              | –              |



Design 4  
Cylindrical bore  
Sealed

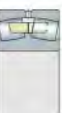


Design 2  
Mounting dimensions



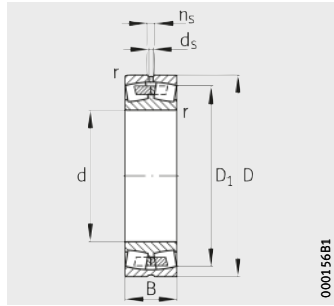
Design 4  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | $e$                 | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 252,4               | 347,6         | 2,5           | 1 160               | 2 200                   | 0,25                | 2,74  | 4,08  | 2,68  | 130                                  | 1 400  | 1 310   |
| 252,4               | 347,6         | 2,5           | 1 160               | 2 200                   | 0,25                | 2,74  | 4,08  | 2,68  | 130                                  | 1 400  | 1 310   |
| 252,4               | 347,6         | 2,5           | 1 460               | 2 850                   | 0,27                | 2,49  | 3,71  | 2,43  | 150                                  | 315  | –   |
| 252,4               | 347,6         | 2,5           | 1 500               | 2 900                   | 0,32                | 2,1   | 3,13  | 2,06  | 150                                  | 1 300  | 970   |
| 252,4               | 347,6         | 2,5           | 1 500               | 2 900                   | 0,32                | 2,1   | 3,13  | 2,06  | 150                                  | 1 300  | 970   |
| 257                 | 383           | 3             | 1 860               | 3 250                   | 0,33                | 2,06  | 3,06  | 2,01  | 177                                  | 1 300  | 970   |
| 257                 | 383           | 3             | 1 860               | 3 250                   | 0,33                | 2,06  | 3,06  | 2,01  | 177                                  | 1 300  | 970   |
| 257                 | 383           | 3             | 2 120               | 3 900                   | 0,41                | 1,66  | 2,47  | 1,62  | 231                                  | 1 200  | 660   |
| 257                 | 383           | 3             | 2 120               | 3 900                   | 0,41                | 1,66  | 2,47  | 1,62  | 231                                  | 1 200  | 660   |
| 257                 | 423           | 3             | 1 960               | 3 050                   | 0,29                | 2,35  | 3,5   | 2,3   | 184                                  | 1 300  | 1 180   |
| 257                 | 423           | 3             | 1 960               | 3 050                   | 0,29                | 2,35  | 3,5   | 2,3   | 184                                  | 1 300  | 1 180   |
| 257                 | 423           | 3             | 2 450               | 4 250                   | 0,37                | 1,8   | 2,69  | 1,76  | 231                                  | 1 300  | 750   |
| 257                 | 423           | 3             | 2 450               | 4 250                   | 0,37                | 1,8   | 2,69  | 1,76  | 231                                  | 1 300  | 750   |
| 260                 | 480           | 4             | 2 650               | 3 900                   | 0,35                | 1,95  | 2,9   | 1,91  | 249                                  | 1 500  | 870   |
| 260                 | 480           | 4             | 2 650               | 3 900                   | 0,35                | 1,95  | 2,9   | 1,91  | 249                                  | 1 500  | 870   |
| 260                 | 480           | 4             | 3 350               | 5 200                   | 0,43                | 1,58  | 2,35  | 1,54  | 270                                  | 1 100  | –   |
| 268,8               | 311,2         | 2             | 415                 | 1 000                   | 0,12                | 5,72  | 8,51  | 5,59  | 67                                   | 1 540  | –   |
| 268,8               | 311,2         | 2             | 415                 | 1 000                   | 0,12                | 5,72  | 8,51  | 5,59  | 67                                   | 1 540  | –   |
| 268,8               | 311,2         | 2             | 570                 | 1 400                   | 0,17                | 3,95  | 5,88  | 3,86  | –                                    | 1 300  | –   |
| 268,8               | 311,2         | 2             | 570                 | 1 400                   | 0,17                | 3,95  | 5,88  | 3,86  | –                                    | 1 300  | –   |
| 270,2               | 349,8         | 2,1           | 930                 | 1 930                   | 0,19                | 3,54  | 5,27  | 3,46  | 108                                  | 1 400  | 1 190   |
| 270,2               | 349,8         | 2,1           | 930                 | 1 930                   | 0,19                | 3,54  | 5,27  | 3,46  | 108                                  | 1 400  | 1 190   |
| 270,2               | 349,8         | 2,1           | 1 120               | 2 400                   | 0,26                | 2,57  | 3,83  | 2,52  | 218                                  | 1 200  | –   |
| 270,2               | 349,8         | 2,1           | 1 120               | 2 400                   | 0,26                | 2,57  | 3,83  | 2,52  | 218                                  | 1 200  | –   |
| 274,6               | 385,4         | 3             | 1 500               | 2 800                   | 0,26                | 2,64  | 3,93  | 2,58  | 155                                  | 1 300  | 1 160   |
| 274,6               | 385,4         | 3             | 1 500               | 2 800                   | 0,26                | 2,64  | 3,93  | 2,58  | 155                                  | 1 300  | 1 160   |
| 274,6               | 385,4         | 3             | 1 900               | 3 800                   | 0,35                | 1,94  | 2,88  | 1,89  | 204                                  | 1 100  | 870   |
| 274,6               | 385,4         | 3             | 1 900               | 3 800                   | 0,35                | 1,94  | 2,88  | 1,89  | 204                                  | 1 100  | 870   |
| 277                 | 423           | 3             | 2 200               | 4 000                   | 0,33                | 2,03  | 3,02  | 1,98  | 213                                  | 1 200  | 850   |
| 277                 | 423           | 3             | 2 200               | 4 000                   | 0,33                | 2,03  | 3,02  | 1,98  | 213                                  | 1 200  | 850   |
| 277                 | 423           | 3             | 2 700               | 5 100                   | 0,42                | 1,61  | 2,4   | 1,58  | 315                                  | 1 100  | 550   |
| 277                 | 423           | 3             | 2 700               | 5 100                   | 0,42                | 1,61  | 2,4   | 1,58  | 315                                  | 1 100  | 550   |
| 277                 | 423           | 3             | 2 700               | 5 100                   | 0,42                | 1,61  | 2,4   | 1,58  | 340                                  | 260  | –   |

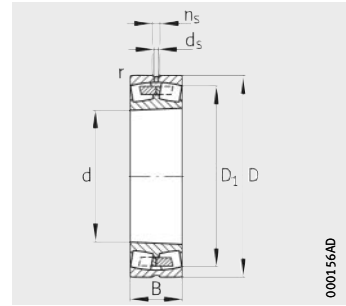


# Spherical roller bearings

Cylindrical or tapered bore  
Open or sealed



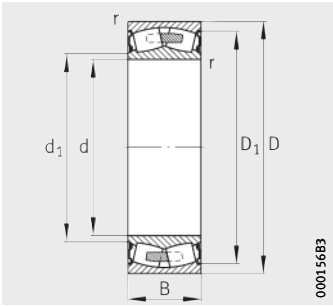
Design 2  
With central rib  
Cylindrical bore



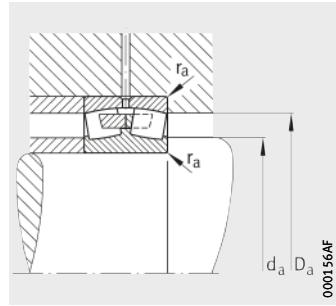
With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

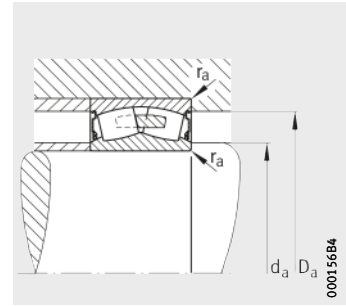
| Designation    | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |           |                     |                |                |
|----------------|--------|-------------------|------------|-----|-----|-----------|---------------------|----------------|----------------|
|                |        |                   | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 22252-B-K-MB   | 2      | 106               | 260        | 480 | 130 | 5         | 415,3               | 12,5           | 23,5           |
| 22252-B-MB     | 2      | 110               | 260        | 480 | 130 | 5         | 415,3               | 12,5           | 23,5           |
| 23252-B-K-MB   | 2      | 138               | 260        | 480 | 174 | 5         | 405,4               | 12,5           | 23,5           |
| 23252-B-MB     | 2      | 144               | 260        | 480 | 174 | 5         | 405,4               | 12,5           | 23,5           |
| 22352-K-MB     | 2      | 177               | 260        | 540 | 165 | 6         | 452,1               | 12,5           | 23,5           |
| 22352-MB       | 2      | 185               | 260        | 540 | 165 | 6         | 452,1               | 12,5           | 23,5           |
| 23856-MB       | 2      | 11,9              | 280        | 350 | 52  | 2         | 330,7               | 4,8            | 9,5            |
| 23856-K-MB     | 2      | 11,9              | 280        | 350 | 52  | 2         | 330,7               | 4,8            | 9,5            |
| 24856-B-K30-MB | 2      | 15,2              | 280        | 350 | 69  | 2         | 328,6               | 4,8            | 9,5            |
| 24856-B-MB     | 2      | 15,2              | 280        | 350 | 69  | 2         | 328,6               | 4,8            | 9,5            |
| 23956-K-MB     | 2      | 24,7              | 280        | 380 | 75  | 2,1       | 350                 | 8              | 15             |
| 23956-MB       | 2      | 25,5              | 280        | 380 | 75  | 2,1       | 350                 | 8              | 15             |
| 24956-K30-MB   | 2      | 33,1              | 280        | 380 | 100 | 2,1       | 349                 | 4,8            | 9,5            |
| 24956-MB       | 2      | 33,1              | 280        | 380 | 100 | 2,1       | 349                 | 4,8            | 9,5            |
| 23056-B-K-MB   | 2      | 50,3              | 280        | 420 | 106 | 4         | 376,5               | 9,5            | 17,7           |
| 23056-B-MB     | 2      | 52,9              | 280        | 420 | 106 | 4         | 376,5               | 9,5            | 17,7           |
| F-803071.PRL   | 4      | 38,9              | 280        | 420 | 140 | 4         | 369,5               | –              | –              |
| 24056-B-K30-MB | 2      | 69,7              | 280        | 420 | 140 | 4         | 369,5               | 6,3            | 12,2           |
| 24056-B-MB     | 2      | 70,8              | 280        | 420 | 140 | 4         | 369,5               | 6,3            | 12,2           |
| 23156-B-K-MB   | 2      | 96,4              | 280        | 460 | 146 | 5         | 401,4               | 9,5            | 17,7           |
| 23156-B-MB     | 2      | 99,5              | 280        | 460 | 146 | 5         | 401,4               | 9,5            | 17,7           |
| 24156-B-K30    | 2      | 118               | 280        | 460 | 180 | 5         | 392,8               | 8              | 15             |
| 24156-B        | 2      | 119               | 280        | 460 | 180 | 5         | 392,8               | 8              | 15             |
| 22256-B-K-MB   | 2      | 110               | 280        | 500 | 130 | 5         | 435,2               | 12,5           | 23,5           |
| 22256-B-MB     | 2      | 113               | 280        | 500 | 130 | 5         | 435,2               | 12,5           | 23,5           |
| 23256-K-MB     | 2      | 153               | 280        | 500 | 176 | 5         | 426,3               | 12,5           | 23,5           |
| 23256-MB       | 2      | 157               | 280        | 500 | 176 | 5         | 426,3               | 12,5           | 23,5           |
| 22356-K-MB     | 2      | 224               | 280        | 580 | 175 | 6         | 489,3               | 12,5           | 23,5           |
| 22356-MB       | 2      | 233               | 280        | 580 | 175 | 6         | 489,3               | 12,5           | 23,5           |
| 23860-MB       | 2      | 16,3              | 300        | 380 | 60  | 2,1       | 357,8               | 4,8            | 9,5            |
| 23860-K-MB     | 2      | 16,3              | 300        | 380 | 60  | 2,1       | 357,8               | 4,8            | 9,5            |
| 24860-B-K30-MB | 2      | 21,3              | 300        | 380 | 80  | 2,1       | 355                 | 4,8            | 9,5            |
| 24860-B-MB     | 2      | 21,3              | 300        | 380 | 80  | 2,1       | 355                 | 4,8            | 9,5            |



Design 4  
Cylindrical bore  
Sealed

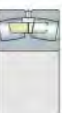


Design 2  
Mounting dimensions



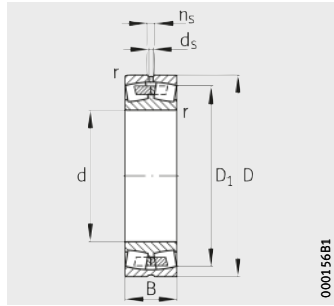
Design 4  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 280                 | 460           | 4             | 2 240               | 3 450                   | 0,29                | 2,32  | 3,45  | 2,26  | 217                                  | 1 100  | 1 070   |
| 280                 | 460           | 4             | 2 240               | 3 450                   | 0,29                | 2,32  | 3,45  | 2,26  | 217                                  | 1 100  | 1 070   |
| 280                 | 460           | 4             | 2 900               | 4 900                   | 0,37                | 1,8   | 2,69  | 1,76  | 270                                  | 1 100  | 660   |
| 280                 | 460           | 4             | 2 900               | 4 900                   | 0,37                | 1,8   | 2,69  | 1,76  | 270                                  | 1 100  | 660   |
| 286                 | 514           | 5             | 3 000               | 4 400                   | 0,34                | 2     | 2,98  | 1,96  | 290                                  | 1 100  | 790   |
| 286                 | 514           | 5             | 3 000               | 4 400                   | 0,34                | 2     | 2,98  | 1,96  | 290                                  | 1 100  | 790   |
| 288,8               | 341,2         | 2             | 520                 | 1 220                   | 0,13                | 5,23  | 7,79  | 5,11  | 82                                   | 1 300  | –   |
| 288,8               | 341,2         | 2             | 520                 | 1 220                   | 0,13                | 5,23  | 7,79  | 5,11  | 82                                   | 1 300  | –   |
| 288,8               | 341,2         | 2             | 710                 | 1 760                   | 0,18                | 3,8   | 5,66  | 3,72  | –                                    | 1 200  | –   |
| 288,8               | 341,2         | 2             | 710                 | 1 760                   | 0,18                | 3,8   | 5,66  | 3,72  | –                                    | 1 200  | –   |
| 290,2               | 369,8         | 2,1           | 970                 | 2 040                   | 0,18                | 3,76  | 5,59  | 3,67  | 129                                  | 1 300  | 1 100   |
| 290,2               | 369,8         | 2,1           | 970                 | 2 040                   | 0,18                | 3,76  | 5,59  | 3,67  | 129                                  | 1 300  | 1 100   |
| 290,2               | 369,8         | 2,1           | 1 180               | 2 600                   | 0,25                | 2,74  | 4,08  | 2,68  | –                                    | 1 100  | –   |
| 290,2               | 369,8         | 2,1           | 1 180               | 2 600                   | 0,25                | 2,74  | 4,08  | 2,68  | –                                    | 1 100  | –   |
| 294,6               | 405,4         | 3             | 1 560               | 3 000                   | 0,25                | 2,74  | 4,08  | 2,68  | 156                                  | 1 300  | 1 090   |
| 294,6               | 405,4         | 3             | 1 560               | 3 000                   | 0,25                | 2,74  | 4,08  | 2,68  | 156                                  | 1 300  | 1 090   |
| 294,6               | 405,4         | 3             | 1 930               | 3 900                   | 0,28                | 2,45  | 3,64  | 2,39  | 226                                  | 260  | –   |
| 294,6               | 405,4         | 3             | 2 000               | 4 000                   | 0,33                | 2,04  | 3,04  | 2     | 225                                  | 1 100  | 810   |
| 294,6               | 405,4         | 3             | 2 000               | 4 000                   | 0,33                | 2,04  | 3,04  | 2     | 225                                  | 1 100  | 810   |
| 300                 | 440           | 4             | 2 360               | 4 400                   | 0,32                | 2,12  | 3,15  | 2,07  | 241                                  | 1 100  | 780   |
| 300                 | 440           | 4             | 2 360               | 4 400                   | 0,32                | 2,12  | 3,15  | 2,07  | 241                                  | 1 100  | 780   |
| 300                 | 440           | 4             | 2 700               | 5 200                   | 0,39                | 1,71  | 2,54  | 1,67  | 365                                  | 1 000  | 520   |
| 300                 | 440           | 4             | 2 700               | 5 200                   | 0,39                | 1,71  | 2,54  | 1,67  | 365                                  | 1 000  | 520   |
| 300                 | 480           | 4             | 2 360               | 3 650                   | 0,28                | 2,43  | 3,61  | 2,37  | 238                                  | 1 100  | 1 010   |
| 300                 | 480           | 4             | 2 360               | 3 650                   | 0,28                | 2,43  | 3,61  | 2,37  | 238                                  | 1 100  | 1 010   |
| 300                 | 480           | 4             | 3 000               | 5 300                   | 0,36                | 1,86  | 2,77  | 1,82  | 260                                  | 1 100  | 620   |
| 300                 | 480           | 4             | 3 000               | 5 300                   | 0,36                | 1,86  | 2,77  | 1,82  | 260                                  | 1 100  | 620   |
| 306                 | 554           | 5             | 3 550               | 5 400                   | 0,33                | 2,03  | 3,02  | 1,98  | 335                                  | 950  | 680   |
| 306                 | 554           | 5             | 3 550               | 5 400                   | 0,33                | 2,03  | 3,02  | 1,98  | 335                                  | 950  | 680   |
| 310,2               | 369,8         | 2,1           | 620                 | 1 460                   | 0,14                | 4,82  | 7,18  | 4,71  | 100                                  | 1 300  | –   |
| 310,2               | 369,8         | 2,1           | 620                 | 1 460                   | 0,14                | 4,82  | 7,18  | 4,71  | 100                                  | 1 300  | –   |
| 310,2               | 369,8         | 2,1           | 915                 | 2 240                   | 0,19                | 3,58  | 5,33  | 3,5   | –                                    | 1 100  | –   |
| 310,2               | 369,8         | 2,1           | 915                 | 2 240                   | 0,19                | 3,58  | 5,33  | 3,5   | –                                    | 1 100  | –   |

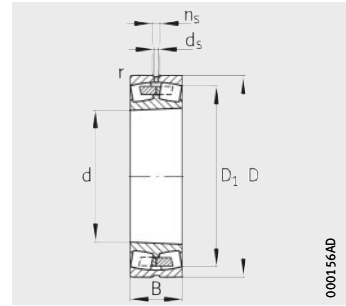


# Spherical roller bearings

Cylindrical or tapered bore



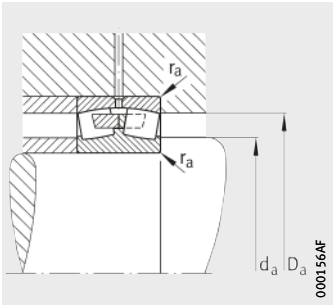
Design 2  
With central rib  
Cylindrical bore



With central rib  
K = taper 1:12  
K30 = taper 1:30

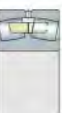
Dimension table (continued) · Dimensions in mm

| Designation    | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |           |                     |                |                |
|----------------|--------|-------------------|------------|-----|-----|-----------|---------------------|----------------|----------------|
|                |        |                   | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 23960-B-K-MB   | 2      | 39,1              | 300        | 420 | 90  | 3         | 384,6               | 9,5            | 17,7           |
| 23960-B-MB     | 2      | 40,6              | 300        | 420 | 90  | 3         | 384,6               | 9,5            | 17,7           |
| 24960-B-K30-MB | 2      | 48                | 300        | 420 | 118 | 3         | 381,3               | 6,3            | 12,2           |
| 24960-B-MB     | 2      | 48                | 300        | 420 | 118 | 3         | 381,3               | 6,3            | 12,2           |
| 23060-K-MB     | 2      | 72,2              | 300        | 460 | 118 | 4         | 412,6               | 9,5            | 17,7           |
| 23060-MB       | 2      | 73,8              | 300        | 460 | 118 | 4         | 412,6               | 9,5            | 17,7           |
| 24060-B-K30-MB | 2      | 97,7              | 300        | 460 | 160 | 4         | 401,5               | 8              | 15             |
| 24060-B-MB     | 2      | 102               | 300        | 460 | 160 | 4         | 401,5               | 8              | 15             |
| 23160-B-K-MB   | 2      | 123               | 300        | 500 | 160 | 5         | 434,7               | 9,5            | 17,7           |
| 23160-B-MB     | 2      | 131               | 300        | 500 | 160 | 5         | 434,7               | 9,5            | 17,7           |
| 24160-B-K30    | 2      | 158               | 300        | 500 | 200 | 5         | 424,4               | 8              | 15             |
| 24160-B        | 2      | 159               | 300        | 500 | 200 | 5         | 424,4               | 8              | 15             |
| 22260-K-MB     | 2      | 136               | 300        | 540 | 140 | 5         | 468,8               | 12,5           | 23,5           |
| 22260-MB       | 2      | 142               | 300        | 540 | 140 | 5         | 468,8               | 12,5           | 23,5           |
| 23260-K-MB     | 2      | 192               | 300        | 540 | 192 | 5         | 458,7               | 12,5           | 23,5           |
| 23260-MB       | 2      | 195               | 300        | 540 | 192 | 5         | 458,7               | 12,5           | 23,5           |
| 22360-MB       | 2      | 299               | 300        | 620 | 185 | 7,5       | 523,6               | 12,5           | 23,5           |
| 22360-K-MB     | 2      | 365               | 300        | 620 | 185 | 7,5       | 523,6               | 12,5           | 23,5           |
| 23864-K-MB     | 2      | 17,9              | 320        | 400 | 60  | 2,1       | 378,1               | 4,8            | 9,5            |
| 23864-MB       | 2      | 17,9              | 320        | 400 | 60  | 2,1       | 378,1               | 4,8            | 9,5            |
| 24864-B-K30-MB | 2      | 24,6              | 320        | 400 | 80  | 2,1       | 375,4               | 4,8            | 9,5            |
| 24864-B-MB     | 2      | 24,6              | 320        | 400 | 80  | 2,1       | 375,4               | 4,8            | 9,5            |
| 23964-K-MB     | 2      | 41                | 320        | 440 | 90  | 3         | 406,2               | 9,5            | 17,7           |
| 23964-MB       | 2      | 41,8              | 320        | 440 | 90  | 3         | 406,2               | 9,5            | 17,7           |
| 24964-K30-MB   | 2      | 49,8              | 320        | 440 | 118 | 3         | 402,4               | 6,3            | 12,2           |
| 24964-MB       | 2      | 49,8              | 320        | 440 | 118 | 3         | 402,4               | 6,3            | 12,2           |
| 23064-K-MB     | 2      | 77,1              | 320        | 480 | 121 | 4         | 432,6               | 9,5            | 17,7           |
| 23064-MB       | 2      | 79,9              | 320        | 480 | 121 | 4         | 432,6               | 9,5            | 17,7           |
| 24064-B-K30-MB | 2      | 103               | 320        | 480 | 160 | 4         | 424                 | 8              | 15             |
| 24064-B-MB     | 2      | 107               | 320        | 480 | 160 | 4         | 424                 | 8              | 15             |
| 23164-K-MB     | 2      | 167               | 320        | 540 | 176 | 5         | 466,2               | 12,5           | 23,5           |
| 23164-MB       | 2      | 171               | 320        | 540 | 176 | 5         | 466,2               | 12,5           | 23,5           |
| 24164-B-K30    | 2      | 197               | 320        | 540 | 218 | 5         | 456,1               | 9,5            | 17,7           |
| 24164-B        | 2      | 204               | 320        | 540 | 218 | 5         | 456,1               | 9,5            | 17,7           |



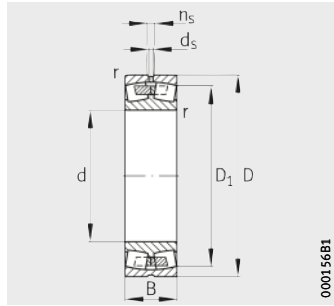
Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                | Calculation factors |       |       |       | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|-------|--------------------|----------------|---------------------|-------|-------|-------|--------------------|-------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn. $C_r$         | stat. $C_{0r}$ | $e$                 | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$           | $n_G$             | $n_B$             |
| min.                | max.  | max.  | kN                 | kN             |                     |       |       |       | kN                 | $\text{min}^{-1}$ | $\text{min}^{-1}$ |
| 312,4               | 407,6 | 2,5   | 1 270              | 2 650          | 0,2                 | 3,42  | 5,09  | 3,34  | 165                | 1 190             | 1 000             |
| 312,4               | 407,6 | 2,5   | 1 270              | 2 650          | 0,2                 | 3,42  | 5,09  | 3,34  | 165                | 1 190             | 1 000             |
| 312,4               | 407,6 | 2,5   | 1 560              | 3 400          | 0,26                | 2,57  | 3,83  | 2,52  | –                  | 1 000             | –                 |
| 312,4               | 407,6 | 2,5   | 1 560              | 3 400          | 0,26                | 2,57  | 3,83  | 2,52  | –                  | 1 000             | –                 |
| 314,6               | 445,4 | 3     | 1 960              | 3 650          | 0,25                | 2,69  | 4     | 2,63  | 223                | 1 100             | 960               |
| 314,6               | 445,4 | 3     | 1 960              | 3 650          | 0,25                | 2,69  | 4     | 2,63  | 223                | 1 100             | 960               |
| 314,6               | 445,4 | 3     | 2 500              | 5 200          | 0,35                | 1,95  | 2,9   | 1,91  | 300                | 1 000             | 700               |
| 314,6               | 445,4 | 3     | 2 500              | 5 200          | 0,35                | 1,95  | 2,9   | 1,91  | 300                | 1 000             | 700               |
| 320                 | 480   | 4     | 2 650              | 4 900          | 0,33                | 2,06  | 3,06  | 2,01  | 270                | 1 100             | 720               |
| 320                 | 480   | 4     | 2 650              | 4 900          | 0,33                | 2,06  | 3,06  | 2,01  | 270                | 1 100             | 720               |
| 320                 | 480   | 4     | 3 250              | 6 300          | 0,4                 | 1,67  | 2,49  | 1,63  | 540                | 900               | 455               |
| 320                 | 480   | 4     | 3 250              | 6 300          | 0,4                 | 1,67  | 2,49  | 1,63  | 540                | 900               | 455               |
| 320                 | 520   | 4     | 2 750              | 4 400          | 0,27                | 2,47  | 3,67  | 2,41  | 300                | 1 000             | 900               |
| 320                 | 520   | 4     | 2 750              | 4 400          | 0,27                | 2,47  | 3,67  | 2,41  | 300                | 1 000             | 900               |
| 320                 | 520   | 4     | 3 450              | 6 200          | 0,37                | 1,83  | 2,72  | 1,79  | 300                | 1 000             | 560               |
| 320                 | 520   | 4     | 3 450              | 6 200          | 0,37                | 1,83  | 2,72  | 1,79  | 300                | 1 000             | 560               |
| 332                 | 588   | 6     | 4 000              | 6 100          | 0,33                | 2,06  | 3,06  | 2,01  | 375                | 900               | 630               |
| 332                 | 588   | 6     | 4 000              | 6 100          | 0,33                | 2,06  | 3,06  | 2,01  | 375                | 900               | 630               |
| 330,2               | 389,8 | 2,1   | 680                | 1 630          | 0,13                | 5,06  | 7,53  | 4,95  | 113                | 1 200             | –                 |
| 330,2               | 389,8 | 2,1   | 680                | 1 630          | 0,13                | 5,06  | 7,53  | 4,95  | 113                | 1 200             | –                 |
| 330,2               | 389,8 | 2,1   | 965                | 2 450          | 0,18                | 3,8   | 5,66  | 3,72  | 220                | 1 100             | –                 |
| 330,2               | 389,8 | 2,1   | 965                | 2 450          | 0,18                | 3,8   | 5,66  | 3,72  | 220                | 1 100             | –                 |
| 332,4               | 427,6 | 2,5   | 1 310              | 2 750          | 0,19                | 3,62  | 5,39  | 3,54  | 202                | 1 100             | 930               |
| 332,4               | 427,6 | 2,5   | 1 310              | 2 750          | 0,19                | 3,62  | 5,39  | 3,54  | 202                | 1 100             | 930               |
| 332,4               | 427,6 | 2,5   | 1 630              | 3 600          | 0,25                | 2,71  | 4,04  | 2,65  | –                  | 1 000             | –                 |
| 332,4               | 427,6 | 2,5   | 1 630              | 3 600          | 0,25                | 2,71  | 4,04  | 2,65  | –                  | 1 000             | –                 |
| 334,6               | 465,4 | 3     | 2 040              | 4 000          | 0,25                | 2,74  | 4,08  | 2,68  | 243                | 1 100             | 900               |
| 334,6               | 465,4 | 3     | 2 040              | 4 000          | 0,25                | 2,74  | 4,08  | 2,68  | 243                | 1 100             | 900               |
| 334,6               | 465,4 | 3     | 2 600              | 5 400          | 0,33                | 2,06  | 3,06  | 2,01  | 360                | 950               | 660               |
| 334,6               | 465,4 | 3     | 2 600              | 5 400          | 0,33                | 2,06  | 3,06  | 2,01  | 360                | 950               | 660               |
| 340                 | 520   | 4     | 3 200              | 6 000          | 0,34                | 1,98  | 2,94  | 1,93  | 305                | 950               | 650               |
| 340                 | 520   | 4     | 3 200              | 6 000          | 0,34                | 1,98  | 2,94  | 1,93  | 305                | 950               | 650               |
| 340                 | 520   | 4     | 3 800              | 7 350          | 0,41                | 1,65  | 2,46  | 1,61  | 530                | 850               | 415               |
| 340                 | 520   | 4     | 3 800              | 7 350          | 0,41                | 1,65  | 2,46  | 1,61  | 530                | 850               | 415               |

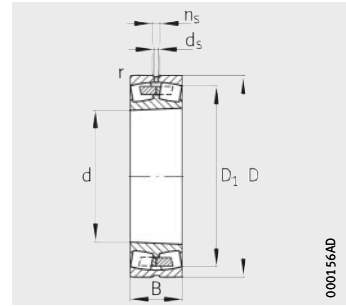


# Spherical roller bearings

Cylindrical or tapered bore



Design 2  
With central rib  
Cylindrical bore

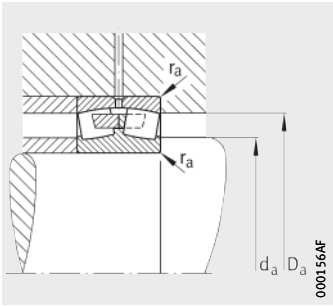


With central rib  
K = taper 1:12  
K30 = taper 1:30

**Dimension table** (continued) · Dimensions in mm

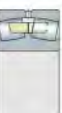
| Designation    | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |           |                     |                |                |
|----------------|--------|-------------------|------------|-----|-----|-----------|---------------------|----------------|----------------|
|                |        |                   | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 22264-K-MB     | 2      | 166               | 320        | 580 | 150 | 5         | 503,5               | 12,5           | 23,5           |
| 22264-MB       | 2      | 177               | 320        | 580 | 150 | 5         | 503,5               | 12,5           | 23,5           |
| 23264-K-MB     | 2      | 229               | 320        | 580 | 208 | 5         | 489,6               | 12,5           | 23,5           |
| 23264-MB       | 2      | 242               | 320        | 580 | 208 | 5         | 489,6               | 12,5           | 23,5           |
| 22364-B-MB     | 2      | 350               | 320        | 670 | 200 | 7,5       | 568,1               | 12,5           | 23,5           |
| 22364-B-K-MB   | 2      | 433               | 320        | 670 | 200 | 7,5       | 568,1               | 12,5           | 23,5           |
| 23868-MB       | 2      | 18,7              | 340        | 420 | 60  | 2,1       | 398,3               | 4,8            | 9,5            |
| 23868-K-MB     | 2      | 18,7              | 340        | 420 | 60  | 2,1       | 398,3               | 4,8            | 9,5            |
| 24868-B-K30-MB | 2      | 28,4              | 340        | 420 | 80  | 2,1       | 396                 | 4,8            | 9,5            |
| 24868-B-MB     | 2      | 28,4              | 340        | 420 | 80  | 2,1       | 396                 | 4,8            | 9,5            |
| 23968-MB       | 2      | 47,8              | 340        | 460 | 90  | 3         | 426,7               | 9,5            | 17,7           |
| 24968-B-K30-MB | 2      | 56,7              | 340        | 460 | 118 | 3         | 422,4               | 6,3            | 12,2           |
| 24968-B-MB     | 2      | 56,7              | 340        | 460 | 118 | 3         | 422,4               | 6,3            | 12,2           |
| 23068-K-MB     | 2      | 101               | 340        | 520 | 133 | 5         | 464,6               | 12,5           | 23,5           |
| 23068-MB       | 2      | 105               | 340        | 520 | 133 | 5         | 464,6               | 12,5           | 23,5           |
| 24068-B-K30-MB | 2      | 143               | 340        | 520 | 180 | 5         | 457,1               | 9,5            | 17,7           |
| 24068-B-MB     | 2      | 146               | 340        | 520 | 180 | 5         | 457,1               | 9,5            | 17,7           |
| 23168-B-K-MB   | 2      | 210               | 340        | 580 | 190 | 5         | 499,5               | 12,5           | 23,5           |
| 23168-B-MB     | 2      | 217               | 340        | 580 | 190 | 5         | 499,5               | 12,5           | 23,5           |
| 24168-B-K30    | 2      | 260               | 340        | 580 | 243 | 5         | 481,1               | 9,5            | 17,7           |
| 24168-B        | 2      | 266               | 340        | 580 | 243 | 5         | 481,1               | 9,5            | 17,7           |
| 22268-B-MB     | 2      | 226               | 340        | 620 | 165 | 6         | 538,7               | 12,5           | 23,5           |
| 22268-B-K-MB   | 2      | 311               | 340        | 620 | 165 | 6         | 538,7               | 12,5           | 23,5           |
| 23268-B-K-MB   | 2      | 291               | 340        | 620 | 224 | 6         | 521,2               | 12,5           | 23,5           |
| 23268-B-MB     | 2      | 309               | 340        | 620 | 224 | 6         | 521,2               | 12,5           | 23,5           |
| 22368-MB       | 2      | 451               | 340        | 710 | 212 | 7,5       | 602,1               | 12,5           | 23,5           |
| 23872-MB       | 2      | 19,7              | 360        | 440 | 60  | 2,1       | 418,5               | 4,8            | 9,5            |
| 23872-K-MB     | 2      | 19,7              | 360        | 440 | 60  | 2,1       | 418,5               | 4,8            | 9,5            |
| 24872-B-K30-MB | 2      | 30,3              | 360        | 440 | 80  | 2,1       | 415,4               | 4,8            | 9,5            |
| 24872-B-MB     | 2      | 30,3              | 360        | 440 | 80  | 2,1       | 415,4               | 4,8            | 9,5            |
| 23972-K-MB     | 2      | 45                | 360        | 480 | 90  | 3         | 447,1               | 9,5            | 17,7           |
| 23972-MB       | 2      | 46,5              | 360        | 480 | 90  | 3         | 447,1               | 9,5            | 17,7           |
| 24972-B-MB     | 2      | 57,3              | 360        | 480 | 118 | 3         | 443,8               | 6,3            | 12,2           |
| 24972-B-K30-MB | 2      | 57,3              | 360        | 480 | 118 | 3         | 443,8               | 6,3            | 12,2           |





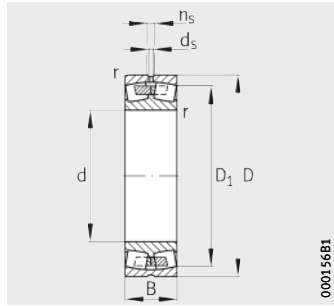
Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                | Calculation factors |       |       |       | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|-------|--------------------|----------------|---------------------|-------|-------|-------|--------------------|-------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn. $C_r$         | stat. $C_{0r}$ | $e$                 | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$           | $n_G$             | $n_B$             |
| min.                | max.  | max.  | kN                 | kN             |                     |       |       |       | kN                 | $\text{min}^{-1}$ | $\text{min}^{-1}$ |
| 340                 | 560   | 4     | 3 050              | 4 900          | 0,27                | 2,47  | 3,67  | 2,41  | 345                | 950               | 830               |
| 340                 | 560   | 4     | 3 050              | 4 900          | 0,27                | 2,47  | 3,67  | 2,41  | 345                | 950               | 830               |
| 340                 | 560   | 4     | 3 900              | 6 950          | 0,37                | 1,8   | 2,69  | 1,76  | 330                | 950               | 510               |
| 340                 | 560   | 4     | 3 900              | 6 950          | 0,37                | 1,8   | 2,69  | 1,76  | 330                | 950               | 510               |
| 352                 | 638   | 6     | 4 400              | 6 800          | 0,33                | 2,06  | 3,06  | 2,01  | 495                | 800               | 560               |
| 352                 | 638   | 6     | 4 400              | 6 800          | 0,33                | 2,06  | 3,06  | 2,01  | 540                | 800               | 560               |
| 350,2               | 409,8 | 2,1   | 710                | 1 730          | 0,13                | 5,32  | 7,92  | 5,2   | 121                | 1 100             | –                 |
| 350,2               | 409,8 | 2,1   | 710                | 1 730          | 0,13                | 5,32  | 7,92  | 5,2   | 121                | 1 100             | –                 |
| 350,2               | 409,8 | 2,1   | 965                | 2 500          | 0,18                | 3,8   | 5,66  | 3,72  | 151                | 980               | –                 |
| 350,2               | 409,8 | 2,1   | 965                | 2 500          | 0,18                | 3,8   | 5,66  | 3,72  | 151                | 980               | –                 |
| 352,4               | 447,6 | 2,5   | 1 370              | 3 000          | 0,18                | 3,85  | 5,73  | 3,76  | 199                | 1 100             | 860               |
| 352,4               | 447,6 | 2,5   | 1 700              | 3 750          | 0,24                | 2,84  | 4,23  | 2,78  | –                  | 950               | –                 |
| 352,4               | 447,6 | 2,5   | 1 700              | 3 750          | 0,24                | 2,84  | 4,23  | 2,78  | –                  | 950               | –                 |
| 358                 | 502   | 4     | 2 360              | 4 550          | 0,25                | 2,69  | 4     | 2,63  | 285                | 1 000             | 840               |
| 358                 | 502   | 4     | 2 360              | 4 550          | 0,25                | 2,69  | 4     | 2,63  | 285                | 1 000             | 840               |
| 358                 | 502   | 4     | 3 100              | 6 550          | 0,34                | 1,98  | 2,94  | 1,93  | 530                | 850               | 600               |
| 358                 | 502   | 4     | 3 100              | 6 550          | 0,34                | 1,98  | 2,94  | 1,93  | 530                | 850               | 600               |
| 360                 | 560   | 4     | 3 650              | 6 950          | 0,34                | 1,98  | 2,94  | 1,93  | 570                | 900               | 590               |
| 360                 | 560   | 4     | 3 650              | 6 950          | 0,34                | 1,98  | 2,94  | 1,93  | 570                | 900               | 590               |
| 360                 | 560   | 4     | 4 400              | 8 500          | 0,43                | 1,56  | 2,32  | 1,53  | 680                | 800               | 380               |
| 360                 | 560   | 4     | 4 400              | 8 500          | 0,43                | 1,56  | 2,32  | 1,53  | 680                | 800               | 380               |
| 366                 | 594   | 5     | 3 550              | 5 850          | 0,28                | 2,43  | 3,61  | 2,37  | 470                | 850               | 750               |
| 366                 | 594   | 5     | 3 550              | 5 850          | 0,28                | 2,43  | 3,61  | 2,37  | 470                | 850               | 750               |
| 366                 | 594   | 5     | 4 500              | 8 150          | 0,38                | 1,78  | 2,65  | 1,74  | 650                | 850               | 465               |
| 366                 | 594   | 5     | 4 500              | 8 150          | 0,38                | 1,78  | 2,65  | 1,74  | 650                | 850               | 465               |
| 372                 | 678   | 6     | 5 200              | 8 150          | 0,33                | 2,06  | 3,06  | 2,01  | 485                | 750               | 500               |
| 370,2               | 429,8 | 2,1   | 750                | 1 900          | 0,12                | 5,72  | 8,51  | 5,59  | 129                | 1 100             | –                 |
| 370,2               | 429,8 | 2,1   | 750                | 1 900          | 0,12                | 5,72  | 8,51  | 5,59  | 129                | 1 100             | –                 |
| 370                 | 430   | 2     | 1 040              | 2 700          | 0,16                | 4,22  | 6,29  | 4,13  | 181                | 940               | –                 |
| 370                 | 430   | 2     | 1 040              | 2 700          | 0,16                | 4,22  | 6,29  | 4,13  | 181                | 940               | –                 |
| 372,4               | 467,6 | 2,5   | 1 430              | 3 200          | 0,17                | 4,05  | 6,04  | 3,96  | 209                | 1 000             | 800               |
| 372,4               | 467,6 | 2,5   | 1 430              | 3 200          | 0,17                | 4,05  | 6,04  | 3,96  | 209                | 1 000             | 800               |
| 372,4               | 467,6 | 2,5   | 1 730              | 3 900          | 0,22                | 3,01  | 4,48  | 2,94  | 330                | 850               | –                 |
| 372,4               | 467,6 | 2,5   | 1 730              | 3 900          | 0,22                | 3,01  | 4,48  | 2,94  | 330                | 850               | –                 |

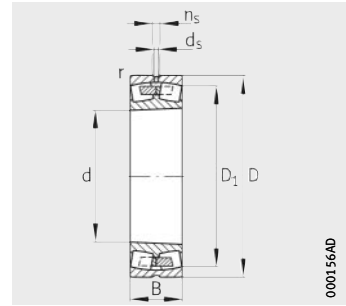


# Spherical roller bearings

Cylindrical or tapered bore



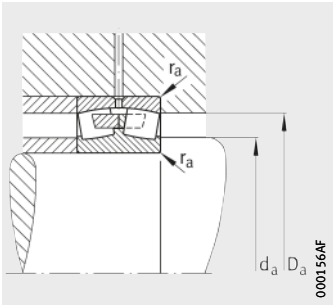
Design 2  
With central rib  
Cylindrical bore



With central rib  
K = taper 1:12  
K30 = taper 1:30

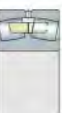
Dimension table (continued) · Dimensions in mm

| Designation    | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |           |                     |                |                |
|----------------|--------|-------------------|------------|-----|-----|-----------|---------------------|----------------|----------------|
|                |        |                   | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 23072-K-MB     | 2      | 107               | 360        | 540 | 134 | 5         | 485,2               | 12,5           | 23,5           |
| 23072-MB       | 2      | 112               | 360        | 540 | 134 | 5         | 485,2               | 12,5           | 23,5           |
| 24072-B-K30-MB | 2      | 147               | 360        | 540 | 180 | 5         | 478,5               | 9,5            | 17,7           |
| 24072-B-MB     | 2      | 149               | 360        | 540 | 180 | 5         | 478,5               | 9,5            | 17,7           |
| 23172-K-MB     | 2      | 221               | 360        | 600 | 192 | 5         | 520                 | 12,5           | 23,5           |
| 23172-MB       | 2      | 227               | 360        | 600 | 192 | 5         | 520                 | 12,5           | 23,5           |
| 24172-B-K30    | 2      | 275               | 360        | 600 | 243 | 5         | 503,6               | 9,5            | 17,7           |
| 24172-B        | 2      | 279               | 360        | 600 | 243 | 5         | 503,6               | 9,5            | 17,7           |
| 22272-K-MB     | 2      | 257               | 360        | 650 | 170 | 6         | 565                 | 12,5           | 23,5           |
| 22272-MB       | 2      | 257               | 360        | 650 | 170 | 6         | 565                 | 12,5           | 23,5           |
| 23272-B-K-MB   | 2      | 328               | 360        | 650 | 232 | 6         | 548,3               | 12,5           | 23,5           |
| 23272-B-MB     | 2      | 347               | 360        | 650 | 232 | 6         | 548,3               | 12,5           | 23,5           |
| 22372-MB       | 2      | 500               | 360        | 750 | 224 | 7,5       | 634,9               | 12,5           | 23,5           |
| 22372-K-MB     | 2      | 625               | 360        | 750 | 224 | 7,5       | 634,9               | 12,5           | 23,5           |
| 23876-MB       | 2      | 33,5              | 380        | 480 | 75  | 2,1       | 450,7               | 6,3            | 12,2           |
| 23876-K-MB     | 2      | 33,5              | 380        | 480 | 75  | 2,1       | 450,7               | 6,3            | 12,2           |
| 24876-MB       | 2      | 44,7              | 380        | 480 | 100 | 2,1       | 448                 | 6,3            | 12,2           |
| 24876-K30-MB   | 2      | 44,7              | 380        | 480 | 100 | 2,1       | 448                 | 6,3            | 12,2           |
| 23976-K-MB     | 2      | 66,3              | 380        | 520 | 106 | 4         | 477,6               | 9,5            | 17,7           |
| 23976-MB       | 2      | 69,1              | 380        | 520 | 106 | 4         | 477,6               | 9,5            | 17,7           |
| 24976-B-K30-MB | 2      | 91,1              | 380        | 520 | 140 | 4         | 475,1               | 6,3            | 12,2           |
| 24976-B-MB     | 2      | 91,1              | 380        | 520 | 140 | 4         | 475,1               | 6,3            | 12,2           |
| 23076-B-K-MB   | 2      | 115               | 380        | 560 | 135 | 5         | 505,6               | 12,5           | 23,5           |
| 23076-B-MB     | 2      | 117               | 380        | 560 | 135 | 5         | 505,6               | 12,5           | 23,5           |
| 24076-B-K30-MB | 2      | 155               | 380        | 560 | 180 | 5         | 499                 | 9,5            | 17,7           |
| 24076-B-MB     | 2      | 158               | 380        | 560 | 180 | 5         | 499                 | 9,5            | 17,7           |
| 23176-K-MB     | 2      | 226               | 380        | 620 | 194 | 5         | 539,6               | 12,5           | 23,5           |
| 23176-MB       | 2      | 241               | 380        | 620 | 194 | 5         | 539,6               | 12,5           | 23,5           |
| 24176-B-K30    | 2      | 277               | 380        | 620 | 243 | 5         | 525,8               | 9,5            | 17,7           |
| 24176-B        | 2      | 279               | 380        | 620 | 243 | 5         | 525,8               | 9,5            | 17,7           |
| 22276-K-MB     | 2      | 284               | 380        | 680 | 175 | 6         | 592,6               | 12,5           | 23,5           |
| 22276-MB       | 2      | 284               | 380        | 680 | 175 | 6         | 592,6               | 12,5           | 23,5           |
| 23276-B-K-MB   | 2      | 367               | 380        | 680 | 240 | 6         | 576,4               | 12,5           | 23,5           |
| 23276-B-MB     | 2      | 390               | 380        | 680 | 240 | 6         | 576,4               | 12,5           | 23,5           |
| 22376-B-MB     | 2      | 533               | 380        | 780 | 230 | 7,5       | 663,5               | 12,5           | 23,5           |



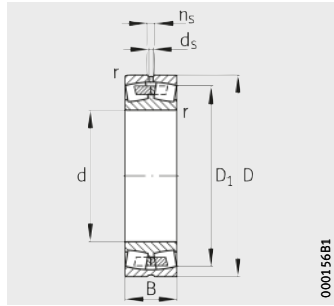
Mounting dimensions

| Mounting dimensions |       |      | Basic load ratings |           | Calculation factors |      |      |      | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|------|--------------------|-----------|---------------------|------|------|------|--------------------|-------------------|-------------------|
| da                  | Da    | ra   | dyn. Cr            | stat. Cor | e                   | Y1   | Y2   | Y0   | Cur                | nG                | nB                |
| min.                | max.  | max. | kN                 | kN        |                     |      |      |      | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 378                 | 522   | 4    | 2 450              | 4 800     | 0,25                | 2,74 | 4,08 | 2,68 | 295                | 950               | 790               |
| 378                 | 522   | 4    | 2 450              | 4 800     | 0,25                | 2,74 | 4,08 | 2,68 | 295                | 950               | 790               |
| 378                 | 522   | 4    | 3 250              | 6 800     | 0,33                | 2,06 | 3,06 | 2,01 | 530                | 800               | 560               |
| 378                 | 522   | 4    | 3 250              | 6 800     | 0,33                | 2,06 | 3,06 | 2,01 | 530                | 800               | 560               |
| 380                 | 580   | 4    | 3 800              | 7 350     | 0,33                | 2,06 | 3,06 | 2,01 | 360                | 850               | 550               |
| 380                 | 580   | 4    | 3 800              | 7 350     | 0,33                | 2,06 | 3,06 | 2,01 | 360                | 850               | 550               |
| 380                 | 580   | 4    | 4 500              | 9 000     | 0,41                | 1,63 | 2,43 | 1,6  | 550                | 750               | 355               |
| 380                 | 580   | 4    | 4 500              | 9 000     | 0,41                | 1,63 | 2,43 | 1,6  | 550                | 750               | 355               |
| 386                 | 624   | 5    | 3 900              | 6 550     | 0,28                | 2,43 | 3,61 | 2,37 | 420                | 800               | 700               |
| 386                 | 624   | 5    | 3 900              | 6 550     | 0,28                | 2,43 | 3,61 | 2,37 | 420                | 800               | 700               |
| 386                 | 624   | 5    | 4 900              | 9 150     | 0,38                | 1,78 | 2,65 | 1,74 | 720                | 800               | 425               |
| 386                 | 624   | 5    | 4 900              | 9 150     | 0,38                | 1,78 | 2,65 | 1,74 | 720                | 800               | 425               |
| 392                 | 718   | 6    | 5 600              | 8 800     | 0,33                | 2,06 | 3,06 | 2,01 | 650                | 700               | 480               |
| 392                 | 718   | 6    | 5 600              | 8 800     | 0,33                | 2,06 | 3,06 | 2,01 | 650                | 700               | 480               |
| 390,2               | 469,8 | 2,1  | 965                | 2 400     | 0,14                | 4,98 | 7,41 | 4,87 | 163                | 1 000             | –                 |
| 390,2               | 469,8 | 2,1  | 965                | 2 400     | 0,14                | 4,98 | 7,41 | 4,87 | 163                | 1 000             | –                 |
| 390,2               | 469,8 | 2,1  | 1 400              | 3 600     | 0,18                | 3,66 | 5,46 | 3,58 | –                  | 850               | –                 |
| 390,2               | 469,8 | 2,1  | 1 400              | 3 600     | 0,18                | 3,66 | 5,46 | 3,58 | –                  | 850               | –                 |
| 394,6               | 505,4 | 3    | 1 760              | 4 000     | 0,19                | 3,58 | 5,33 | 3,5  | 265                | 950               | 750               |
| 394,6               | 505,4 | 3    | 1 760              | 4 000     | 0,19                | 3,58 | 5,33 | 3,5  | 265                | 950               | 750               |
| 394,6               | 505,4 | 3    | 2 280              | 5 200     | 0,25                | 2,69 | 4    | 2,63 | 435                | 800               | –                 |
| 394,6               | 505,4 | 3    | 2 280              | 5 200     | 0,25                | 2,69 | 4    | 2,63 | 435                | 800               | –                 |
| 398                 | 542   | 4    | 2 550              | 5 300     | 0,24                | 2,84 | 4,23 | 2,78 | 430                | 900               | 730               |
| 398                 | 542   | 4    | 2 550              | 5 300     | 0,24                | 2,84 | 4,23 | 2,78 | 430                | 900               | 730               |
| 398                 | 542   | 4    | 3 350              | 7 200     | 0,31                | 2,15 | 3,2  | 2,1  | 580                | 750               | 520               |
| 398                 | 542   | 4    | 3 350              | 7 200     | 0,31                | 2,15 | 3,2  | 2,1  | 580                | 750               | 520               |
| 400                 | 600   | 4    | 4 050              | 8 150     | 0,32                | 2,12 | 3,15 | 2,07 | 385                | 800               | 510               |
| 400                 | 600   | 4    | 4 050              | 8 150     | 0,32                | 2,12 | 3,15 | 2,07 | 385                | 800               | 510               |
| 400                 | 600   | 4    | 4 650              | 9 500     | 0,39                | 1,71 | 2,54 | 1,67 | 770                | 700               | 330               |
| 400                 | 600   | 4    | 4 650              | 9 500     | 0,39                | 1,71 | 2,54 | 1,67 | 770                | 700               | 330               |
| 406                 | 654   | 5    | 4 150              | 7 100     | 0,27                | 2,51 | 3,74 | 2,45 | 550                | 750               | 630               |
| 406                 | 654   | 5    | 4 150              | 7 100     | 0,27                | 2,51 | 3,74 | 2,45 | 550                | 750               | 630               |
| 406                 | 654   | 5    | 5 300              | 9 800     | 0,37                | 1,8  | 2,69 | 1,76 | 780                | 750               | 395               |
| 406                 | 654   | 5    | 5 300              | 9 800     | 0,37                | 1,8  | 2,69 | 1,76 | 780                | 750               | 395               |
| 412                 | 748   | 6    | 6 000              | 9 500     | 0,32                | 2,13 | 3,17 | 2,08 | 690                | 670               | 450               |

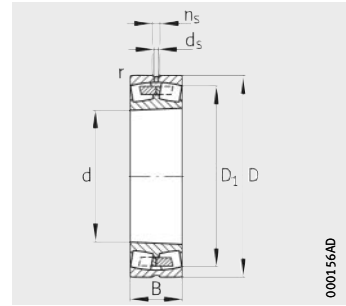


# Spherical roller bearings

Cylindrical or tapered bore



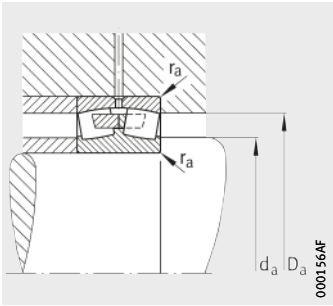
Design 2  
With central rib  
Cylindrical bore



With central rib  
K = taper 1:12  
K30 = taper 1:30

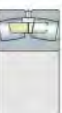
**Dimension table** (continued) · Dimensions in mm

| Designation    | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |     |                |                |                |
|----------------|--------|-------------------|------------|-----|-----|-----|----------------|----------------|----------------|
|                |        |                   | d          | D   | B   | r   | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
| 23880-MB       | 2      | 35,2              | 400        | 500 | 75  | 2,1 | 471            | 6,3            | 12,2           |
| 23880-K-MB     | 2      | 43,6              | 400        | 500 | 75  | 2,1 | 471            | 6,3            | 12,2           |
| 24880-B-K30-MB | 2      | 16,8              | 400        | 500 | 100 | 2,1 | 468,5          | 6,3            | 12,2           |
| 24880-B-MB     | 2      | 16,8              | 400        | 500 | 100 | 2,1 | 468,5          | 6,3            | 12,2           |
| 23980-B-K-MB   | 2      | 68,2              | 400        | 540 | 106 | 4   | 499            | 9,5            | 17,7           |
| 23980-B-MB     | 2      | 72,9              | 400        | 540 | 106 | 4   | 499            | 9,5            | 17,7           |
| 24980-B-K30-MB | 2      | 95,7              | 400        | 540 | 140 | 4   | 494,6          | 6,3            | 12,2           |
| 24980-B-MB     | 2      | 95,7              | 400        | 540 | 140 | 4   | 494,6          | 6,3            | 12,2           |
| 23080-K-MB     | 2      | 143               | 400        | 600 | 148 | 5   | 540,5          | 12,5           | 23,5           |
| 23080-MB       | 2      | 151               | 400        | 600 | 148 | 5   | 540,5          | 12,5           | 23,5           |
| 24080-B-K30-MB | 2      | 196               | 400        | 600 | 200 | 5   | 530,9          | 12,5           | 23,5           |
| 24080-B-MB     | 2      | 198               | 400        | 600 | 200 | 5   | 530,9          | 12,5           | 23,5           |
| 23180-B-K-MB   | 2      | 261               | 400        | 650 | 200 | 6   | 567,2          | 12,5           | 23,5           |
| 23180-B-MB     | 2      | 270               | 400        | 650 | 200 | 6   | 567,2          | 12,5           | 23,5           |
| 24180-B-K30    | 2      | 312               | 400        | 650 | 250 | 6   | 553,5          | 12,5           | 23,5           |
| 24180-B        | 2      | 326               | 400        | 650 | 250 | 6   | 553,5          | 12,5           | 23,5           |
| 22280-MB       | 2      | 329               | 400        | 720 | 185 | 6   | 629,3          | 12,5           | 23,5           |
| 22280-K-MB     | 2      | 414               | 400        | 720 | 185 | 6   | 629,3          | 12,5           | 23,5           |
| 23280-B-K-MB   | 2      | 442               | 400        | 720 | 256 | 6   | 609,8          | 12,5           | 23,5           |
| 23280-B-MB     | 2      | 469               | 400        | 720 | 256 | 6   | 609,8          | 12,5           | 23,5           |
| 22380-MB       | 2      | 627               | 400        | 820 | 243 | 7,5 | 694,4          | 12,5           | 23,5           |
| 22380-K-MB     | 2      | 800               | 400        | 820 | 243 | 7,5 | 694,4          | 12,5           | 23,5           |
| 23884-MB       | 2      | 36,3              | 420        | 520 | 75  | 2,1 | 491,3          | 6,3            | 12,2           |
| 23884-K-MB     | 2      | 36,3              | 420        | 520 | 75  | 2,1 | 491,3          | 6,3            | 12,2           |
| 24884-K30-MB   | 2      | 47,9              | 420        | 520 | 100 | 2,1 | 488,9          | 6,3            | 12,2           |
| 24884-MB       | 2      | 47,9              | 420        | 520 | 100 | 2,1 | 488,9          | 6,3            | 12,2           |
| 23984-MB       | 2      | 75,5              | 420        | 560 | 106 | 4   | 519,5          | 9,5            | 17,7           |
| 23984-K-MB     | 2      | 78                | 420        | 560 | 106 | 4   | 519,5          | 9,5            | 17,7           |
| 24984-B-K30-MB | 2      | 101               | 420        | 560 | 140 | 4   | 516,8          | 6,3            | 12,2           |
| 24984-B-MB     | 2      | 101               | 420        | 560 | 140 | 4   | 516,8          | 6,3            | 12,2           |
| 23084-B-K-MB   | 2      | 155               | 420        | 620 | 150 | 5   | 560,7          | 12,5           | 23,5           |
| 23084-B-MB     | 2      | 162               | 420        | 620 | 150 | 5   | 560,7          | 12,5           | 23,5           |
| 24084-B-K30-MB | 2      | 214               | 420        | 620 | 200 | 5   | 550,2          | 12,5           | 23,5           |
| 24084-B-MB     | 2      | 217               | 420        | 620 | 200 | 5   | 550,2          | 12,5           | 23,5           |



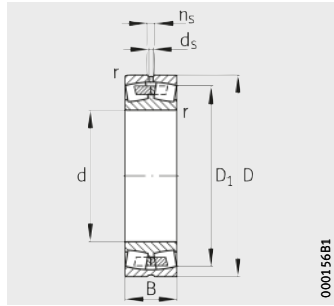
Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                | Calculation factors |       |       |       | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|-------|--------------------|----------------|---------------------|-------|-------|-------|--------------------|-------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn. $C_r$         | stat. $C_{0r}$ | $e$                 | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$           | $n_G$             | $n_B$             |
| min.                | max.  | max.  | kN                 | kN             |                     |       |       |       | kN                 | $\text{min}^{-1}$ | $\text{min}^{-1}$ |
| 410,2               | 489,8 | 2,1   | 1 060              | 2 650          | 0,13                | 5,14  | 7,66  | 5,03  | 174                | 950               | –                 |
| 410,2               | 489,8 | 2,1   | 1 060              | 2 650          | 0,13                | 5,14  | 7,66  | 5,03  | 174                | 950               | –                 |
| 410,2               | 489,8 | 2,1   | 1 460              | 3 800          | 0,18                | 3,8   | 5,66  | 3,72  | 248                | 800               | –                 |
| 410,2               | 489,8 | 2,1   | 1 460              | 3 800          | 0,18                | 3,8   | 5,66  | 3,72  | 248                | 800               | –                 |
| 414,6               | 525,4 | 3     | 1 830              | 4 150          | 0,18                | 3,71  | 5,52  | 3,63  | 275                | 900               | 710               |
| 414,6               | 525,4 | 3     | 1 830              | 4 150          | 0,18                | 3,71  | 5,52  | 3,63  | 275                | 900               | 710               |
| 414,6               | 525,4 | 3     | 2 280              | 5 300          | 0,24                | 2,81  | 4,19  | 2,75  | 188                | 750               | –                 |
| 414,6               | 525,4 | 3     | 2 280              | 5 300          | 0,24                | 2,81  | 4,19  | 2,75  | 188                | 750               | –                 |
| 418                 | 582   | 4     | 3 050              | 6 200          | 0,24                | 2,79  | 4,15  | 2,73  | 365                | 800               | 670               |
| 418                 | 582   | 4     | 3 050              | 6 200          | 0,24                | 2,79  | 4,15  | 2,73  | 365                | 800               | 670               |
| 418                 | 582   | 4     | 3 900              | 8 500          | 0,33                | 2,06  | 3,06  | 2,01  | 670                | 700               | 485               |
| 418                 | 582   | 4     | 3 900              | 8 500          | 0,33                | 2,06  | 3,06  | 2,01  | 670                | 700               | 485               |
| 426                 | 624   | 5     | 4 250              | 8 500          | 0,31                | 2,15  | 3,2   | 2,1   | 670                | 750               | 485               |
| 426                 | 624   | 5     | 4 250              | 8 500          | 0,31                | 2,15  | 3,2   | 2,1   | 670                | 750               | 485               |
| 426                 | 624   | 5     | 5 100              | 10 400         | 0,39                | 1,72  | 2,56  | 1,68  | 720                | 670               | 310               |
| 426                 | 624   | 5     | 5 100              | 10 400         | 0,39                | 1,72  | 2,56  | 1,68  | 720                | 670               | 310               |
| 426                 | 694   | 5     | 4 650              | 7 800          | 0,26                | 2,55  | 3,8   | 2,5   | 600                | 700               | 600               |
| 426                 | 694   | 5     | 4 650              | 7 800          | 0,26                | 2,55  | 3,8   | 2,5   | 600                | 700               | 600               |
| 426                 | 694   | 5     | 5 700              | 10 800         | 0,38                | 1,78  | 2,65  | 1,74  | 820                | 700               | 370               |
| 426                 | 694   | 5     | 5 700              | 10 800         | 0,38                | 1,78  | 2,65  | 1,74  | 820                | 700               | 370               |
| 432                 | 788   | 6     | 6 550              | 10 600         | 0,33                | 2,07  | 3,09  | 2,03  | 610                | 670               | 400               |
| 432                 | 788   | 6     | 6 550              | 10 600         | 0,33                | 2,07  | 3,09  | 2,03  | 610                | 670               | 400               |
| 430,2               | 509,8 | 2,1   | 1 080              | 2 750          | 0,12                | 5,42  | 8,06  | 5,3   | 185                | 900               | –                 |
| 430,2               | 509,8 | 2,1   | 1 080              | 2 750          | 0,12                | 5,42  | 8,06  | 5,3   | 185                | 900               | –                 |
| 430,2               | 509,8 | 2,1   | 1 500              | 3 900          | 0,17                | 3,95  | 5,88  | 3,86  | –                  | 750               | –                 |
| 430,2               | 509,8 | 2,1   | 1 500              | 3 900          | 0,17                | 3,95  | 5,88  | 3,86  | –                  | 750               | –                 |
| 434,6               | 545,4 | 3     | 1 900              | 4 500          | 0,18                | 3,85  | 5,73  | 3,76  | 300                | 850               | 660               |
| 434,6               | 545,4 | 3     | 1 900              | 4 500          | 0,18                | 3,85  | 5,73  | 3,76  | 300                | 850               | 660               |
| 434,6               | 545,4 | 3     | 2 360              | 5 600          | 0,23                | 2,92  | 4,35  | 2,86  | –                  | 700               | –                 |
| 434,6               | 545,4 | 3     | 2 360              | 5 600          | 0,23                | 2,92  | 4,35  | 2,86  | –                  | 700               | –                 |
| 438                 | 602   | 4     | 3 150              | 6 550          | 0,24                | 2,84  | 4,23  | 2,78  | 395                | 800               | 640               |
| 438                 | 602   | 4     | 3 150              | 6 550          | 0,24                | 2,84  | 4,23  | 2,78  | 395                | 800               | 640               |
| 438                 | 602   | 4     | 4 000              | 8 800          | 0,32                | 2,13  | 3,17  | 2,08  | 710                | 670               | 460               |
| 438                 | 602   | 4     | 4 000              | 8 800          | 0,32                | 2,13  | 3,17  | 2,08  | 710                | 670               | 460               |

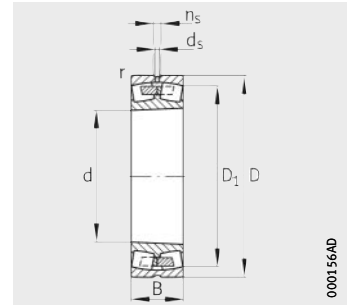


# Spherical roller bearings

Cylindrical or tapered bore



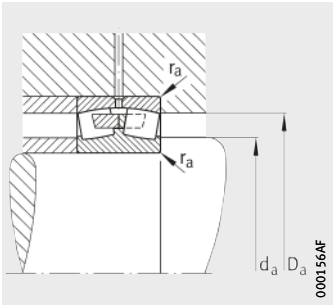
Design 2  
With central rib  
Cylindrical bore



With central rib  
K = taper 1:12  
K30 = taper 1:30

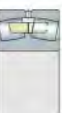
Dimension table (continued) · Dimensions in mm

| Designation    | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |     |                |                |                |
|----------------|--------|-------------------|------------|-----|-----|-----|----------------|----------------|----------------|
|                |        |                   | d          | D   | B   | r   | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> |
|                |        |                   | min.       |     |     |     | ≈              |                |                |
| 23184-K-MB     | 2      | 339               | 420        | 700 | 224 | 6   | 605,4          | 12,5           | 23,5           |
| 23184-MB       | 2      | 360               | 420        | 700 | 224 | 6   | 605,4          | 12,5           | 23,5           |
| 24184-B-K30    | 2      | 407               | 420        | 700 | 280 | 6   | 590,3          | 12,5           | 23,5           |
| 24184-B        | 2      | 442               | 420        | 700 | 280 | 6   | 590,3          | 12,5           | 23,5           |
| 22284-K-MB     | 2      | 404               | 420        | 760 | 195 | 7,5 | 661,8          | 12,5           | 23,5           |
| 22284-MB       | 2      | 404               | 420        | 760 | 195 | 7,5 | 661,8          | 12,5           | 23,5           |
| 23284-B-K-MB   | 2      | 539               | 420        | 760 | 272 | 7,5 | 642,2          | 12,5           | 23,5           |
| 23284-B-MB     | 2      | 555               | 420        | 760 | 272 | 7,5 | 642,2          | 12,5           | 23,5           |
| 22384-MB       | 2      | 746               | 420        | 850 | 250 | 9,5 | 722,6          | 12,5           | 23,5           |
| 23888-K-MB     | 2      | 36                | 440        | 540 | 75  | 2,1 | 511,5          | 6,3            | 12,2           |
| 23888-MB       | 2      | 38,5              | 440        | 540 | 75  | 2,1 | 511,5          | 6,3            | 12,2           |
| 24888-B-K30-MB | 2      | 49,2              | 440        | 540 | 100 | 2,1 | 509,5          | 6,3            | 12,2           |
| 24888-B-MB     | 2      | 49,2              | 440        | 540 | 100 | 2,1 | 509,5          | 6,3            | 12,2           |
| 23988-K-MB     | 2      | 98,3              | 440        | 600 | 118 | 4   | 552,8          | 12,5           | 23,5           |
| 23988-MB       | 2      | 101               | 440        | 600 | 118 | 4   | 552,8          | 12,5           | 23,5           |
| 24988-B-K30-MB | 2      | 125               | 440        | 600 | 160 | 4   | 548,6          | 8              | 15             |
| 24988-B-MB     | 2      | 125               | 440        | 600 | 160 | 4   | 548,6          | 8              | 15             |
| 23088-K-MB     | 2      | 177               | 440        | 650 | 157 | 6   | 586,8          | 12,5           | 23,5           |
| 23088-MB       | 2      | 190               | 440        | 650 | 157 | 6   | 586,8          | 12,5           | 23,5           |
| 24088-B-K30-MB | 2      | 247               | 440        | 650 | 212 | 6   | 575,6          | 12,5           | 23,5           |
| 24088-B-MB     | 2      | 250               | 440        | 650 | 212 | 6   | 575,6          | 12,5           | 23,5           |
| 23188-K-MB     | 2      | 378               | 440        | 720 | 226 | 6   | 626            | 12,5           | 23,5           |
| 23188-MB       | 2      | 381               | 440        | 720 | 226 | 6   | 626            | 12,5           | 23,5           |
| 24188-B-K30    | 2      | 451               | 440        | 720 | 280 | 6   | 612,4          | 12,5           | 23,5           |
| 24188-B        | 2      | 453               | 440        | 720 | 280 | 6   | 612,4          | 12,5           | 23,5           |
| 22288-MB       | 2      | 438               | 440        | 790 | 200 | 7,5 | 689,5          | 12,5           | 23,5           |
| 22288-K-MB     | 2      | 440               | 440        | 790 | 200 | 7,5 | 689,5          | 12,5           | 23,5           |
| 23288-B-K-MB   | 2      | 586               | 440        | 790 | 280 | 7,5 | 669,3          | 12,5           | 23,5           |
| 23288-B-MB     | 2      | 615               | 440        | 790 | 280 | 7,5 | 669,3          | 12,5           | 23,5           |
| 22388-B-MB     | 2      | 895               | 440        | 900 | 265 | 9,5 | 763,9          | 12,5           | 23,5           |
| 23892-K-MB     | 2      | 58                | 460        | 580 | 90  | 3   | 545,7          | 6,3            | 12,2           |
| 23892-MB       | 2      | 58                | 460        | 580 | 90  | 3   | 545,7          | 6,3            | 12,2           |
| 24892-B-MB     | 2      | 71                | 460        | 580 | 118 | 3   | 542,6          | 6,3            | 12,2           |
| 24892-B-K30-MB | 2      | 71                | 460        | 580 | 118 | 3   | 542,6          | 6,3            | 12,2           |



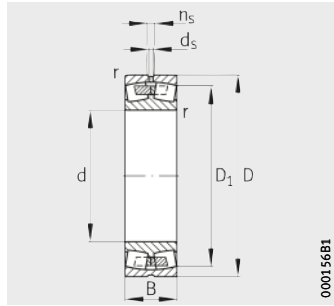
Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                   | Calculation factors |       |       |       | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|-------|--------------------|-------------------|---------------------|-------|-------|-------|--------------------|-------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{0r}$ | $e$                 | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$           | $n_G$             | $n_B$             |
| min.                | max.  | max.  | kN                 | kN                |                     |       |       |       | kN                 | $\text{min}^{-1}$ | $\text{min}^{-1}$ |
| 446                 | 674   | 5     | 5 000              | 9 650             | 0,33                | 2,03  | 3,02  | 1,98  | 465                | 700               | 455               |
| 446                 | 674   | 5     | 5 000              | 9 650             | 0,33                | 2,03  | 3,02  | 1,98  | 465                | 700               | 455               |
| 446                 | 674   | 5     | 6 200              | 12 700            | 0,4                 | 1,67  | 2,49  | 1,63  | 980                | 630               | 265               |
| 446                 | 674   | 5     | 6 200              | 12 700            | 0,4                 | 1,67  | 2,49  | 1,63  | 980                | 630               | 265               |
| 452                 | 728   | 6     | 5 100              | 8 650             | 0,27                | 2,51  | 3,74  | 2,45  | 630                | 670               | 500               |
| 452                 | 728   | 6     | 5 100              | 8 650             | 0,27                | 2,51  | 3,74  | 2,45  | 630                | 670               | 500               |
| 452                 | 728   | 6     | 6 550              | 12 200            | 0,38                | 1,77  | 2,64  | 1,73  | 930                | 670               | 340               |
| 452                 | 728   | 6     | 6 550              | 12 200            | 0,38                | 1,77  | 2,64  | 1,73  | 930                | 670               | 340               |
| 460                 | 810   | 8     | 6 950              | 11 200            | 0,33                | 2,07  | 3,09  | 2,03  | 780                | 630               | 400               |
| 450,2               | 529,8 | 2,1   | 1 120              | 3 000             | 0,12                | 5,72  | 8,51  | 5,59  | 199                | 850               | –                 |
| 450,2               | 529,8 | 2,1   | 1 120              | 3 000             | 0,12                | 5,72  | 8,51  | 5,59  | 199                | 850               | –                 |
| 450,2               | 530   | 2     | 1 500              | 4 000             | 0,18                | 3,76  | 5,59  | 3,67  | 265                | 740               | –                 |
| 450,2               | 530   | 2     | 1 500              | 4 000             | 0,18                | 3,76  | 5,59  | 3,67  | 265                | 740               | –                 |
| 454,6               | 585,4 | 3     | 2 240              | 5 200             | 0,18                | 3,66  | 5,46  | 3,58  | 295                | 800               | 620               |
| 454,6               | 585,4 | 3     | 2 240              | 5 200             | 0,18                | 3,66  | 5,46  | 3,58  | 295                | 800               | 620               |
| 454,6               | 585,4 | 3     | 2 900              | 6 700             | 0,25                | 2,71  | 4,04  | 2,65  | –                  | 670               | –                 |
| 454,6               | 585,4 | 3     | 2 900              | 6 700             | 0,25                | 2,71  | 4,04  | 2,65  | –                  | 670               | –                 |
| 463                 | 627   | 5     | 3 400              | 7 100             | 0,24                | 2,84  | 4,23  | 2,78  | 405                | 750               | 610               |
| 463                 | 627   | 5     | 3 400              | 7 100             | 0,24                | 2,84  | 4,23  | 2,78  | 405                | 750               | 610               |
| 463                 | 627   | 5     | 4 300              | 9 650             | 0,32                | 2,12  | 3,15  | 2,07  | 750                | 630               | 430               |
| 463                 | 627   | 5     | 4 300              | 9 650             | 0,32                | 2,12  | 3,15  | 2,07  | 750                | 630               | 430               |
| 466                 | 694   | 5     | 5 200              | 10 400            | 0,32                | 2,1   | 3,13  | 2,06  | 485                | 700               | 425               |
| 466                 | 694   | 5     | 5 200              | 10 400            | 0,32                | 2,1   | 3,13  | 2,06  | 485                | 700               | 425               |
| 466                 | 694   | 5     | 6 400              | 13 200            | 0,38                | 1,76  | 2,62  | 1,72  | 1 020              | 600               | 255               |
| 466                 | 694   | 5     | 6 400              | 13 200            | 0,38                | 1,76  | 2,62  | 1,72  | 1 020              | 600               | 255               |
| 472                 | 758   | 6     | 5 400              | 9 300             | 0,27                | 2,51  | 3,74  | 2,45  | 680                | 630               | 530               |
| 472                 | 758   | 6     | 5 400              | 9 300             | 0,27                | 2,51  | 3,74  | 2,45  | 680                | 630               | 530               |
| 472                 | 758   | 6     | 7 100              | 13 400            | 0,37                | 1,8   | 2,69  | 1,76  | 990                | 630               | 320               |
| 472                 | 758   | 6     | 7 100              | 13 400            | 0,37                | 1,8   | 2,69  | 1,76  | 990                | 630               | 320               |
| 480                 | 860   | 8     | 7 800              | 12 700            | 0,31                | 2,15  | 3,2   | 2,1   | 910                | 600               | 360               |
| 472,4               | 567,6 | 2,5   | 1 430              | 3 650             | 0,14                | 4,98  | 7,41  | 4,87  | 236                | 800               | –                 |
| 472,4               | 567,6 | 2,5   | 1 430              | 3 650             | 0,14                | 4,98  | 7,41  | 4,87  | 236                | 800               | –                 |
| 472,4               | 567,6 | 2,5   | 1 930              | 5 100             | 0,18                | 3,76  | 5,59  | 3,67  | 330                | 670               | –                 |
| 472,4               | 567,6 | 2,5   | 1 930              | 5 100             | 0,18                | 3,76  | 5,59  | 3,67  | 330                | 670               | –                 |

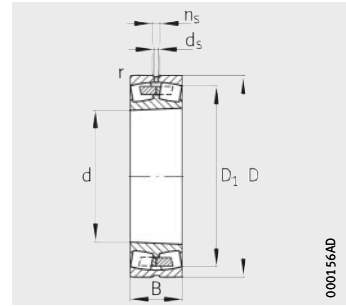


# Spherical roller bearings

Cylindrical or tapered bore



Design 2  
With central rib  
Cylindrical bore

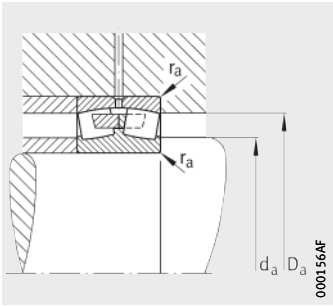


With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

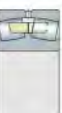
| Designation    | Design | Mass<br>m<br>≈ kg | Dimensions |     |     |           |                     |                |                |
|----------------|--------|-------------------|------------|-----|-----|-----------|---------------------|----------------|----------------|
|                |        |                   | d          | D   | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 23992-B-K-MB   | 2      | 103               | 460        | 620 | 118 | 4         | 573,3               | 12,5           | 23,5           |
| 23992-B-MB     | 2      | 111               | 460        | 620 | 118 | 4         | 573,3               | 12,5           | 23,5           |
| 24992-K30-MB   | 2      | 137               | 460        | 620 | 160 | 4         | 569,3               | 8              | 15             |
| 24992-MB       | 2      | 137               | 460        | 620 | 160 | 4         | 569,3               | 8              | 15             |
| 23092-B-MB     | 2      | 208               | 460        | 680 | 163 | 6         | 612,2               | 12,5           | 23,5           |
| 23092-B-K-MB   | 2      | 204               | 460        | 680 | 163 | 6         | 612,2               | 12,5           | 23,5           |
| 24092-B-MB     | 2      | 282               | 460        | 680 | 218 | 6         | 603,3               | 12,5           | 23,5           |
| 24092-B-K30-MB | 2      | 277               | 460        | 680 | 218 | 6         | 603,3               | 12,5           | 23,5           |
| 23192-K-MB     | 2      | 420               | 460        | 760 | 240 | 7,5       | 661,4               | 12,5           | 23,5           |
| 23192-MB       | 2      | 447               | 460        | 760 | 240 | 7,5       | 661,4               | 12,5           | 23,5           |
| 24192-B-K30-MB | 2      | 578               | 460        | 760 | 300 | 7,5       | 642,8               | 12,5           | 23,5           |
| 24192-B-MB     | 2      | 582               | 460        | 760 | 300 | 7,5       | 642,8               | 12,5           | 23,5           |
| 22292-MB       | 2      | 543               | 460        | 830 | 212 | 7,5       | 723,8               | 12,5           | 23,5           |
| 23292-K-MB     | 2      | 699               | 460        | 830 | 296 | 7,5       | 701,6               | 12,5           | 23,5           |
| 23292-MB       | 2      | 700               | 460        | 830 | 296 | 7,5       | 701,6               | 12,5           | 23,5           |
| 22392-MB       | 2      | 710               | 460        | 950 | 280 | 9,5       | 805,3               | 12,5           | 23,5           |
| 23896-MB       | 2      | 60,8              | 480        | 600 | 90  | 3         | 566                 | 6,3            | 12,2           |
| 23896-K-MB     | 2      | 60,8              | 480        | 600 | 90  | 3         | 566                 | 6,3            | 12,2           |
| 24896-B-K30-MB | 2      | 74                | 480        | 600 | 118 | 3         | 562,8               | 6,3            | 12,2           |
| 24896-B-MB     | 2      | 74                | 480        | 600 | 118 | 3         | 562,8               | 6,3            | 12,2           |
| 23996-B-K-MB   | 2      | 121               | 480        | 650 | 128 | 5         | 598,8               | 12,5           | 23,5           |
| 23996-B-MB     | 2      | 126               | 480        | 650 | 128 | 5         | 598,8               | 12,5           | 23,5           |
| 24996-B-K30-MB | 2      | 153               | 480        | 650 | 170 | 5         | 596,1               | 8              | 15             |
| 24996-B-MB     | 2      | 158               | 480        | 650 | 170 | 5         | 596,1               | 8              | 15             |
| 23096-K-MB     | 2      | 214               | 480        | 700 | 165 | 6         | 632,6               | 12,5           | 23,5           |
| 23096-MB       | 2      | 222               | 480        | 700 | 165 | 6         | 632,6               | 12,5           | 23,5           |
| 24096-B-K30-MB | 2      | 289               | 480        | 700 | 218 | 6         | 625,4               | 12,5           | 23,5           |
| 24096-B-MB     | 2      | 291               | 480        | 700 | 218 | 6         | 625,4               | 12,5           | 23,5           |
| 23196-K-MB     | 2      | 470               | 480        | 790 | 248 | 7,5       | 688,3               | 12,5           | 23,5           |
| 23196-MB       | 2      | 508               | 480        | 790 | 248 | 7,5       | 688,3               | 12,5           | 23,5           |
| 24196-B-K30-MB | 2      | 628               | 480        | 790 | 308 | 7,5       | 669,9               | 12,5           | 23,5           |
| 24196-B-MB     | 2      | 637               | 480        | 790 | 308 | 7,5       | 669,9               | 12,5           | 23,5           |
| 22296-MB       | 2      | 597               | 480        | 870 | 224 | 7,5       | 757,8               | 12,5           | 23,5           |
| 23296-K-MB     | 2      | 806               | 480        | 870 | 310 | 7,5       | 734,8               | 12,5           | 23,5           |
| 23296-MB       | 2      | 830               | 480        | 870 | 310 | 7,5       | 734,8               | 12,5           | 23,5           |
| 22396-B-MB     | 2      | 1060              | 480        | 980 | 290 | 9,5       | 829,4               | 12,5           | 23,5           |





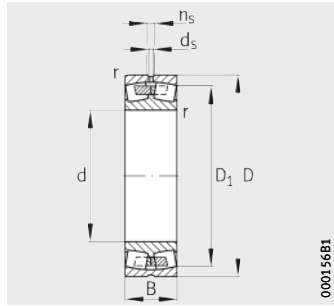
Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                | Calculation factors |       |       |       | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|-------|--------------------|----------------|---------------------|-------|-------|-------|--------------------|-------------------|-------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn. $C_r$         | stat. $C_{0r}$ | $e$                 | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$           | $n_G$             | $n_B$             |
| min.                | max.  | max.  | kN                 | kN             |                     |       |       |       | kN                 | $\text{min}^{-1}$ | $\text{min}^{-1}$ |
| 474,6               | 605,4 | 3     | 2 280              | 5 400          | 0,18                | 3,85  | 5,73  | 3,76  | 370                | 750               | 590               |
| 474,6               | 605,4 | 3     | 2 280              | 5 400          | 0,18                | 3,85  | 5,73  | 3,76  | 370                | 750               | 590               |
| 474,6               | 605,4 | 3     | 3 000              | 6 950          | 0,24                | 2,81  | 4,19  | 2,75  | –                  | 670               | –                 |
| 474,6               | 605,4 | 3     | 3 000              | 6 950          | 0,24                | 2,81  | 4,19  | 2,75  | –                  | 670               | –                 |
| 483                 | 657   | 5     | 3 650              | 7 650          | 0,24                | 2,84  | 4,23  | 2,78  | 520                | 700               | 560               |
| 483                 | 657   | 5     | 3 650              | 7 650          | 0,24                | 2,84  | 4,23  | 2,78  | 520                | 700               | 560               |
| 483                 | 657   | 5     | 4 750              | 10 600         | 0,31                | 2,16  | 3,22  | 2,12  | 710                | 630               | 405               |
| 483                 | 657   | 5     | 4 750              | 10 600         | 0,31                | 2,16  | 3,22  | 2,12  | 710                | 630               | 400               |
| 492                 | 728   | 6     | 5 850              | 11 600         | 0,32                | 2,12  | 3,15  | 2,07  | 530                | 630               | 390               |
| 492                 | 728   | 6     | 5 850              | 11 600         | 0,32                | 2,12  | 3,15  | 2,07  | 530                | 630               | 390               |
| 492                 | 728   | 6     | 7 500              | 15 600         | 0,39                | 1,73  | 2,58  | 1,69  | 1 160              | 560               | 227               |
| 492                 | 728   | 6     | 7 500              | 15 600         | 0,39                | 1,73  | 2,58  | 1,69  | 1 160              | 560               | 227               |
| 492                 | 798   | 6     | 6 100              | 10 800         | 0,27                | 2,51  | 3,74  | 2,45  | –                  | 600               | 480               |
| 492                 | 798   | 6     | 7 800              | 15 000         | 0,37                | 1,8   | 2,69  | 1,76  | 620                | 600               | 295               |
| 492                 | 798   | 6     | 7 800              | 15 000         | 0,37                | 1,8   | 2,69  | 1,76  | 620                | 600               | 295               |
| 492                 | 798   | 6     | 8 500              | 14 000         | 0,33                | 2,07  | 3,09  | 2,03  | –                  | 560               | 340               |
| 492,4               | 587,6 | 2,5   | 1 460              | 3 900          | 0,13                | 5,23  | 7,79  | 5,11  | 248                | 750               | –                 |
| 492,4               | 587,6 | 2,5   | 1 460              | 3 900          | 0,13                | 5,23  | 7,79  | 5,11  | 248                | 750               | –                 |
| 492,4               | 587,6 | 2,5   | 2 000              | 5 400          | 0,17                | 3,9   | 5,81  | 3,81  | –                  | 670               | –                 |
| 492,4               | 587,6 | 2,5   | 2 000              | 5 400          | 0,17                | 3,9   | 5,81  | 3,81  | –                  | 670               | –                 |
| 498                 | 632   | 4     | 2 550              | 6 000          | 0,18                | 3,76  | 5,59  | 3,67  | 460                | 700               | 570               |
| 498                 | 632   | 4     | 2 550              | 6 000          | 0,18                | 3,76  | 5,59  | 3,67  | 460                | 700               | 570               |
| 498                 | 632   | 4     | 3 250              | 7 800          | 0,24                | 2,76  | 4,11  | 2,7   | –                  | 630               | –                 |
| 498                 | 632   | 4     | 3 250              | 7 800          | 0,24                | 2,76  | 4,11  | 2,7   | –                  | 630               | –                 |
| 503                 | 677   | 5     | 3 800              | 8 150          | 0,23                | 2,9   | 4,31  | 2,83  | 455                | 670               | 550               |
| 503                 | 677   | 5     | 3 800              | 8 150          | 0,23                | 2,9   | 4,31  | 2,83  | 455                | 670               | 550               |
| 503                 | 677   | 5     | 4 900              | 11 200         | 0,3                 | 2,25  | 3,34  | 2,2   | 830                | 600               | 380               |
| 503                 | 677   | 5     | 4 900              | 11 200         | 0,3                 | 2,25  | 3,34  | 2,2   | 830                | 600               | 380               |
| 512                 | 758   | 6     | 6 300              | 12 700         | 0,32                | 2,12  | 3,15  | 2,07  | 570                | 630               | 370               |
| 512                 | 758   | 6     | 6 300              | 12 700         | 0,32                | 2,12  | 3,15  | 2,07  | 570                | 630               | 370               |
| 512                 | 758   | 6     | 8 000              | 16 600         | 0,39                | 1,75  | 2,61  | 1,71  | 1 190              | 560               | 213               |
| 512                 | 758   | 6     | 8 000              | 16 600         | 0,39                | 1,75  | 2,61  | 1,71  | 1 190              | 560               | 220               |
| 512                 | 838   | 6     | 6 550              | 11 400         | 0,27                | 2,51  | 3,74  | 2,45  | –                  | 600               | 480               |
| 512                 | 838   | 6     | 8 800              | 17 000         | 0,37                | 1,83  | 2,72  | 1,79  | 700                | 600               | 265               |
| 512                 | 838   | 6     | 8 800              | 17 000         | 0,37                | 1,83  | 2,72  | 1,79  | 700                | 600               | 265               |
| 520                 | 940   | 8     | 9 000              | 15 000         | 0,33                | 2,06  | 3,06  | 2,01  | 1 070              | 530               | 320               |

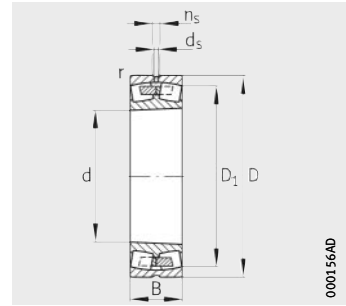


# Spherical roller bearings

Cylindrical or tapered bore



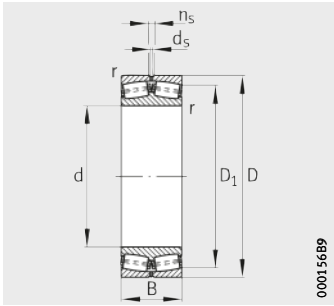
Design 2  
With central rib  
Cylindrical bore



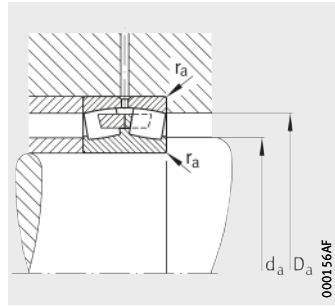
With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

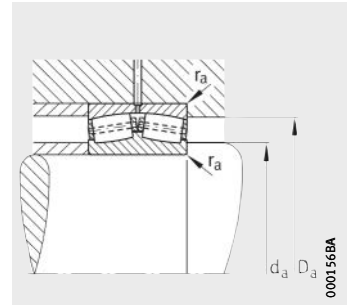
| Designation      | Design | Mass<br>m<br>≈ kg | Dimensions |      |     |           |                     |                |                |
|------------------|--------|-------------------|------------|------|-----|-----------|---------------------|----------------|----------------|
|                  |        |                   | d          | D    | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 238/500-B-MB     | 2      | 60,7              | 500        | 620  | 90  | 3         | 586,2               | 6,3            | 12,2           |
| 238/500-B-MB     | 2      | 63,6              | 500        | 620  | 90  | 3         | 586,2               | 6,3            | 12,2           |
| 248/500-B-K30-MB | 2      | 84,3              | 500        | 620  | 118 | 3         | 583,5               | 6,3            | 12,2           |
| 248/500-B-MB     | 2      | 84,3              | 500        | 620  | 118 | 3         | 583,5               | 6,3            | 12,2           |
| 239/500-K-MB     | 2      | 124               | 500        | 670  | 128 | 5         | 619,3               | 12,5           | 23,5           |
| 239/500-MB       | 2      | 132               | 500        | 670  | 128 | 5         | 619,3               | 12,5           | 23,5           |
| Z-528741.PRL     | 2      | 167               | 500        | 670  | 170 | 5         | 616,8               | 8              | 15             |
| 249/500-K30-MB   | 2      | 172               | 500        | 670  | 170 | 5         | 616,5               | 8              | 15             |
| 249/500-MB       | 2      | 172               | 500        | 670  | 170 | 5         | 616,5               | 8              | 15             |
| Z-541821.249/500 | 3      | 177               | 500        | 670  | 170 | 5         | 616,8               | 8              | 15             |
| 230/500-B-K-MB   | 2      | 219               | 500        | 720  | 167 | 6         | 653,5               | 12,5           | 23,5           |
| 230/500-B-MB     | 2      | 233               | 500        | 720  | 167 | 6         | 653,5               | 12,5           | 23,5           |
| 240/500-B-MB     | 2      | 297               | 500        | 720  | 218 | 6         | 645,8               | 12,5           | 23,5           |
| 240/500-B-K30-MB | 2      | 384               | 500        | 720  | 218 | 6         | 645,8               | 12,5           | 23,5           |
| 231/500-B-K-MB   | 2      | 556               | 500        | 830  | 264 | 7,5       | 720,9               | 12,5           | 23,5           |
| 231/500-B-MB     | 2      | 602               | 500        | 830  | 264 | 7,5       | 720,9               | 12,5           | 23,5           |
| 241/500-B-MB     | 2      | 725               | 500        | 830  | 325 | 7,5       | 701,8               | 12,5           | 23,5           |
| 241/500-B-K30-MB | 2      | 738               | 500        | 830  | 325 | 7,5       | 701,8               | 12,5           | 23,5           |
| 222/500-MB       | 2      | 712               | 500        | 920  | 243 | 7,5       | 798,1               | 12,5           | 23,5           |
| 232/500-K-MB     | 2      | 984               | 500        | 920  | 336 | 7,5       | 773,8               | 12,5           | 23,5           |
| 232/500-MB       | 2      | 1010              | 500        | 920  | 336 | 7,5       | 773,8               | 12,5           | 23,5           |
| 223/500-MB       | 2      | 1030              | 500        | 1030 | 300 | 12        | 872,4               | 12,5           | 23,5           |
| 238/530-MB       | 2      | 67,8              | 530        | 650  | 90  | 3         | 616,4               | 6,3            | 12,2           |
| 238/530-K-MB     | 2      | 67,8              | 530        | 650  | 90  | 3         | 616,4               | 6,3            | 12,2           |
| 248/530-B-MB     | 2      | 89,7              | 530        | 650  | 118 | 3         | 614,1               | 6,3            | 12,2           |
| 248/530-B-K30-MB | 2      | 89,7              | 530        | 650  | 118 | 3         | 614,1               | 6,3            | 12,2           |
| 239/530-K-MB     | 2      | 146               | 530        | 710  | 136 | 5         | 656,5               | 12,5           | 23,5           |
| 239/530-MB       | 2      | 160               | 530        | 710  | 136 | 5         | 656,5               | 12,5           | 23,5           |
| Z-528742.PRL     | 2      | 208               | 530        | 710  | 180 | 5         | 653,2               | 9,5            | 17,7           |
| 249/530-B-K30-MB | 2      | 208               | 530        | 710  | 180 | 5         | 653,2               | 9,5            | 17,7           |
| 249/530-B-MB     | 2      | 208               | 530        | 710  | 180 | 5         | 653,2               | 9,5            | 17,7           |
| Z-541822.249/530 | 3      | 209               | 530        | 710  | 180 | 5         | 653,2               | 9,5            | 17,7           |
| 230/530-K-MB     | 2      | 291               | 530        | 780  | 185 | 6         | 703,7               | 12,5           | 23,5           |
| 230/530-MB       | 2      | 321               | 530        | 780  | 185 | 6         | 703,7               | 12,5           | 23,5           |
| 240/530-B-MB     | 2      | 415               | 530        | 780  | 250 | 6         | 691,9               | 12,5           | 23,5           |
| 240/530-B-K30-MB | 2      | 418               | 530        | 780  | 250 | 6         | 691,9               | 12,5           | 23,5           |



Design 3  
Cylindrical bore with pin cage

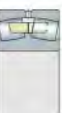


Design 2  
Mounting dimensions



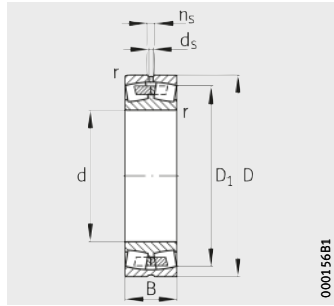
Design 3  
Mounting dimensions

| Mounting dimensions |       |      | Basic load ratings |           | Calculation factors |      |      |      | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|------|--------------------|-----------|---------------------|------|------|------|--------------------|-------------------|-------------------|
| da                  | Da    | ra   | dyn. Cr            | stat. C0r | e                   | Y1   | Y2   | Y0   | Cur                | nG                | nB                |
| min.                | max.  | max. | kN                 | kN        |                     |      |      |      | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 512,4               | 607,6 | 2,5  | 1 530              | 4 150     | 0,12                | 5,42 | 8,06 | 5,3  | 260                | 700               | –                 |
| 512,4               | 607,6 | 2,5  | 1 530              | 4 150     | 0,12                | 5,42 | 8,06 | 5,3  | 260                | 700               | –                 |
| 512,4               | 607,6 | 2,5  | 2 080              | 5 700     | 0,17                | 4    | 5,96 | 3,91 | 265                | 630               | –                 |
| 512,4               | 607,6 | 2,5  | 2 080              | 5 700     | 0,17                | 4    | 5,96 | 3,91 | 265                | 630               | –                 |
| 518                 | 652   | 4    | 2 600              | 6 300     | 0,17                | 3,9  | 5,81 | 3,81 | 400                | 670               | 540               |
| 518                 | 652   | 4    | 2 600              | 6 300     | 0,17                | 3,9  | 5,81 | 3,81 | 400                | 670               | 540               |
| 517                 | 653   | 4    | 3 050              | 7 200     | 0,22                | 3,14 | 4,67 | 3,07 | 490                | 600               | –                 |
| 518                 | 652   | 4    | 3 350              | 8 000     | 0,24                | 2,87 | 4,27 | 2,8  | 490                | 600               | –                 |
| 518                 | 652   | 4    | 3 350              | 8 000     | 0,24                | 2,87 | 4,27 | 2,8  | 490                | 600               | –                 |
| 517                 | 640   | 4    | 3 650              | 9 300     | 0,22                | 3,04 | 4,53 | 2,97 | 610                | 600               | –                 |
| 523                 | 697   | 5    | 3 900              | 8 500     | 0,22                | 3,01 | 4,48 | 2,94 | 510                | 670               | 520               |
| 523                 | 697   | 5    | 3 900              | 8 500     | 0,22                | 3,01 | 4,48 | 2,94 | 510                | 670               | 520               |
| 523                 | 697   | 5    | 4 900              | 11 200    | 0,29                | 2,32 | 3,45 | 2,26 | 850                | 560               | 370               |
| 523                 | 697   | 5    | 4 900              | 11 200    | 0,29                | 2,32 | 3,45 | 2,26 | 850                | 560               | 360               |
| 532                 | 798   | 6    | 7 100              | 14 300    | 0,32                | 2,1  | 3,13 | 2,06 | 990                | 600               | 340               |
| 532                 | 798   | 6    | 7 100              | 14 300    | 0,32                | 2,1  | 3,13 | 2,06 | 990                | 600               | 340               |
| 532                 | 798   | 6    | 8 650              | 18 300    | 0,39                | 1,73 | 2,58 | 1,69 | 1 340              | 530               | 199               |
| 532                 | 798   | 6    | 8 650              | 18 300    | 0,39                | 1,73 | 2,58 | 1,69 | 1 340              | 530               | 199               |
| 532                 | 888   | 6    | 7 500              | 13 200    | 0,28                | 2,41 | 3,59 | 2,35 | –                  | 560               | 430               |
| 532                 | 888   | 6    | 9 650              | 18 300    | 0,38                | 1,78 | 2,65 | 1,74 | 750                | 560               | 260               |
| 532                 | 888   | 6    | 9 650              | 18 300    | 0,38                | 1,78 | 2,65 | 1,74 | 750                | 560               | 260               |
| 548                 | 982   | 10   | 9 800              | 16 300    | 0,32                | 2,09 | 3,11 | 2,04 | –                  | 500               | 300               |
| 542                 | 637,6 | 2,5  | 1 600              | 4 300     | 0,12                | 5,61 | 8,36 | 5,49 | 320                | 670               | –                 |
| 542                 | 637,6 | 2,5  | 1 600              | 4 300     | 0,12                | 5,61 | 8,36 | 5,49 | 320                | 670               | –                 |
| 542,4               | 637,6 | 2,5  | 2 240              | 6 400     | 0,16                | 4,22 | 6,29 | 4,13 | 375                | 600               | –                 |
| 542,4               | 637,6 | 2,5  | 2 240              | 6 400     | 0,16                | 4,22 | 6,29 | 4,13 | 375                | 600               | –                 |
| 548                 | 692   | 4    | 2 850              | 6 800     | 0,18                | 3,85 | 5,73 | 3,76 | 385                | 630               | 500               |
| 548                 | 692   | 4    | 2 850              | 6 800     | 0,18                | 3,85 | 5,73 | 3,76 | 385                | 630               | 500               |
| 548                 | 692   | 4    | 3 400              | 8 150     | 0,22                | 3,14 | 4,67 | 3,07 | 410                | 560               | –                 |
| 548                 | 692   | 4    | 3 750              | 9 150     | 0,24                | 2,87 | 4,27 | 2,8  | 600                | 560               | –                 |
| 548                 | 692   | 4    | 3 750              | 9 150     | 0,24                | 2,87 | 4,27 | 2,8  | 600                | 560               | –                 |
| 547                 | 675   | 4    | 4 050              | 10 200    | 0,22                | 3,04 | 4,53 | 2,97 | 610                | 560               | –                 |
| 553                 | 757   | 5    | 4 400              | 9 500     | 0,22                | 3,04 | 4,53 | 2,97 | 540                | 600               | 490               |
| 553                 | 757   | 5    | 4 400              | 9 500     | 0,22                | 3,04 | 4,53 | 2,97 | 540                | 600               | 490               |
| 553                 | 757   | 5    | 6 000              | 13 700    | 0,31                | 2,15 | 3,2  | 2,1  | 910                | 530               | 335               |
| 553                 | 757   | 5    | 6 000              | 13 700    | 0,31                | 2,15 | 3,2  | 2,1  | 910                | 530               | 340               |

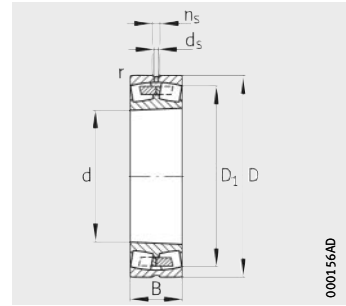


# Spherical roller bearings

Cylindrical or tapered bore



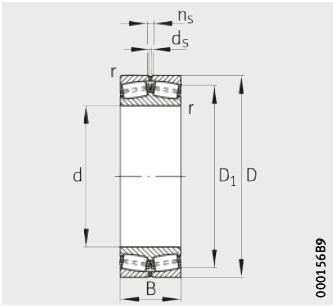
Design 2  
With central rib  
Cylindrical bore



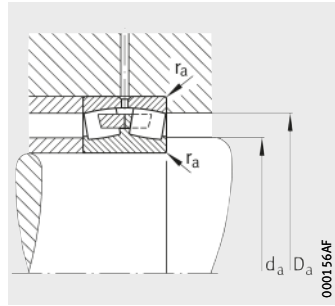
With central rib  
K = taper 1:12  
K30 = taper 1:30

**Dimension table** (continued) · Dimensions in mm

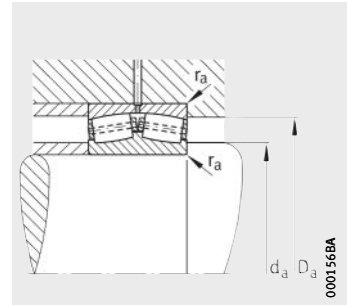
| Designation      | Design | Mass<br>m<br>≈ kg | Dimensions |       |     |           |                     |                |                |
|------------------|--------|-------------------|------------|-------|-----|-----------|---------------------|----------------|----------------|
|                  |        |                   | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 231/530-K-MB     | 2      | 643               | 530        | 870   | 272 | 7,5       | 756,3               | 12,5           | 23,5           |
| 241/530-B-K30-MB | 2      | 845               | 530        | 870   | 335 | 7,5       | 739,1               | 12,5           | 23,5           |
| 241/530-B-MB     | 2      | 856               | 530        | 870   | 335 | 7,5       | 739,1               | 12,5           | 23,5           |
| 222/530-MB       | 2      | 845               | 530        | 980   | 258 | 9,5       | 850                 | 12,5           | 23,5           |
| 232/530-MB       | 2      | 1 240             | 530        | 980   | 355 | 9,5       | 824,4               | 12,5           | 23,5           |
| 232/530-K-MB     | 2      | 1 200             | 530        | 980   | 355 | 9,5       | 824,4               | 12,5           | 23,5           |
| 223/530-MB       | 2      | 1 540             | 530        | 1 090 | 325 | 12        | 918,9               | 12,5           | 23,5           |
| 238/560-K-MB     | 2      | 68,5              | 560        | 680   | 90  | 3         | 646,7               | 6,3            | 12,2           |
| 238/560-MB       | 2      | 68,5              | 560        | 680   | 90  | 3         | 646,7               | 6,3            | 12,2           |
| 248/560-B-K30-MB | 2      | 92,7              | 560        | 680   | 118 | 3         | 644,6               | 6,3            | 12,2           |
| 248/560-B-MB     | 2      | 92,7              | 560        | 680   | 118 | 3         | 644,6               | 6,3            | 12,2           |
| 239/560-B-K-MB   | 2      | 176               | 560        | 750   | 140 | 5         | 693,4               | 12,5           | 23,5           |
| 239/560-B-MB     | 2      | 181               | 560        | 750   | 140 | 5         | 693,4               | 12,5           | 23,5           |
| Z-528743.PRL     | 2      | 235               | 560        | 750   | 190 | 6         | 690                 | 12,5           | 23,5           |
| 249/560-K30-MB   | 2      | 246               | 560        | 750   | 190 | 5         | 690,2               | 9,5            | 17,7           |
| 249/560-MB       | 2      | 246               | 560        | 750   | 190 | 5         | 690,2               | 9,5            | 17,7           |
| Z-541823.249/560 | 3      | 247               | 560        | 750   | 190 | 5         | 690,2               | 9,5            | 17,7           |
| 230/560-B-K-MB   | 2      | 339               | 560        | 820   | 195 | 6         | 741,5               | 12,5           | 23,5           |
| 230/560-B-MB     | 2      | 358               | 560        | 820   | 195 | 6         | 741,5               | 12,5           | 23,5           |
| 240/560-B-K30-MB | 2      | 458               | 560        | 820   | 258 | 6         | 731,2               | 12,5           | 23,5           |
| 240/560-B-MB     | 2      | 472               | 560        | 820   | 258 | 6         | 731,2               | 12,5           | 23,5           |
| 231/560-K-MB     | 2      | 737               | 560        | 920   | 280 | 7,5       | 800,2               | 12,5           | 23,5           |
| 231/560-MB       | 2      | 760               | 560        | 920   | 280 | 7,5       | 800,2               | 12,5           | 23,5           |
| 241/560-B-K30-MB | 2      | 974               | 560        | 920   | 355 | 7,5       | 785                 | 12,5           | 23,5           |
| 241/560-B-MB     | 2      | 979               | 560        | 920   | 355 | 7,5       | 785                 | 12,5           | 23,5           |
| 222/560-MB       | 2      | 1 060             | 560        | 1 030 | 272 | 9,5       | 891,7               | 12,5           | 23,5           |
| 232/560-K-MB     | 2      | 1 360             | 560        | 1 030 | 365 | 9,5       | 868,1               | 12,5           | 23,5           |
| 232/560-MB       | 2      | 1 400             | 560        | 1 030 | 365 | 9,5       | 868,1               | 12,5           | 23,5           |
| 223/560-MB       | 2      | 1 470             | 560        | 1 150 | 335 | 12        | 974,6               | 12,5           | 23,5           |
| 238/600-MB       | 2      | 86,2              | 600        | 730   | 98  | 3         | 696,3               | 6,3            | 12,2           |
| 238/600-K-MB     | 2      | 86,2              | 600        | 730   | 98  | 3         | 696,3               | 6,3            | 12,2           |
| 248/600-B-MB     | 2      | 116               | 600        | 730   | 128 | 3         | 691,5               | 6,3            | 12,2           |
| 248/600-B-K30-MB | 2      | 116               | 600        | 730   | 128 | 3         | 691,5               | 6,3            | 12,2           |



Design 3  
Cylindrical bore with pin cage

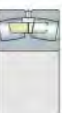


Design 2  
Mounting dimensions



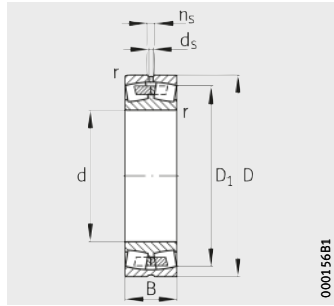
Design 3  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 562                 | 838           | 6             | 7 350               | 15 300                  | 0,32                | 2,12  | 3,15  | 2,07  | 670                                  | 560  | 325   |
| 562                 | 838           | 6             | 9 500               | 20 000                  | 0,38                | 1,77  | 2,64  | 1,73  | 1 450                                | 500  | 184   |
| 562                 | 838           | 6             | 9 500               | 20 000                  | 0,38                | 1,77  | 2,64  | 1,73  | 1 450                                | 500  | 180   |
| 570                 | 940           | 8             | 8 300               | 15 000                  | 0,28                | 2,43  | 3,61  | 2,37  | –                                    | 530  | 400   |
| 570                 | 940           | 8             | 10 800              | 20 800                  | 0,38                | 1,77  | 2,64  | 1,73  | 1 200                                | 530  | 240   |
| 570                 | 940           | 8             | 10 800              | 20 800                  | 0,38                | 1,77  | 2,64  | 1,73  | 1 200                                | 530  | 240   |
| 578                 | 1 042         | 10            | 11 000              | 18 600                  | 0,33                | 2,06  | 3,06  | 2,01  | –                                    | 500  | 280   |
| 572,4               | 667,6         | 2,5           | 1 630               | 4 650                   | 0,11                | 5,94  | 8,84  | 5,81  | 325                                  | 630  | –   |
| 572,4               | 667,6         | 2,5           | 1 630               | 4 650                   | 0,11                | 5,94  | 8,84  | 5,81  | 325                                  | 630  | –   |
| 572,4               | 667,6         | 2,5           | 2 200               | 6 300                   | 0,15                | 4,47  | 6,65  | 4,37  | 390                                  | 560  | –   |
| 572,4               | 667,6         | 2,5           | 2 200               | 6 300                   | 0,15                | 4,47  | 6,65  | 4,37  | 390                                  | 560  | –   |
| 578                 | 732           | 4             | 3 100               | 7 650                   | 0,17                | 3,95  | 5,88  | 3,86  | 570                                  | 600  | 465   |
| 578                 | 732           | 4             | 3 100               | 7 650                   | 0,17                | 3,95  | 5,88  | 3,86  | 570                                  | 600  | 465   |
| 600                 | 710           | 5             | 4 050               | 10 000                  | 0,21                | 3,2   | 4,77  | 3,13  | 415                                  | 530  | –   |
| 578                 | 732           | 4             | 4 150               | 10 400                  | 0,24                | 2,87  | 4,27  | 2,8   | 610                                  | 530  | –   |
| 578                 | 732           | 4             | 4 150               | 10 400                  | 0,24                | 2,87  | 4,27  | 2,8   | 610                                  | 530  | –   |
| 577                 | 710           | 4             | 4 550               | 11 600                  | 0,22                | 3,07  | 4,57  | 3     | 680                                  | 530  | –   |
| 583                 | 797           | 5             | 5 100               | 11 000                  | 0,23                | 2,95  | 4,4   | 2,89  | 740                                  | 560  | 450   |
| 583                 | 797           | 5             | 5 100               | 11 000                  | 0,23                | 2,95  | 4,4   | 2,89  | 740                                  | 560  | 450   |
| 583                 | 797           | 5             | 6 400               | 14 600                  | 0,31                | 2,2   | 3,27  | 2,15  | 1 050                                | 500  | 320   |
| 583                 | 797           | 5             | 6 400               | 14 600                  | 0,31                | 2,2   | 3,27  | 2,15  | 1 050                                | 500  | 315   |
| 592                 | 888           | 6             | 8 150               | 16 600                  | 0,31                | 2,21  | 3,29  | 2,16  | 750                                  | 530  | 300   |
| 592                 | 888           | 6             | 8 150               | 16 600                  | 0,31                | 2,21  | 3,29  | 2,16  | 750                                  | 530  | 300   |
| 592                 | 888           | 6             | 10 600              | 22 400                  | 0,38                | 1,77  | 2,64  | 1,73  | 1 600                                | 480  | 167   |
| 592                 | 888           | 6             | 10 600              | 22 400                  | 0,38                | 1,77  | 2,64  | 1,73  | 1 600                                | 480  | 170   |
| 600                 | 990           | 8             | 9 150               | 16 300                  | 0,28                | 2,39  | 3,56  | 2,34  | 1 100                                | 500  | 380   |
| 600                 | 990           | 8             | 11 600              | 22 400                  | 0,38                | 1,78  | 2,65  | 1,74  | 910                                  | 500  | 220   |
| 600                 | 990           | 8             | 11 600              | 22 400                  | 0,38                | 1,78  | 2,65  | 1,74  | 910                                  | 500  | 220   |
| 608                 | 1 102         | 10            | 12 000              | 20 400                  | 0,32                | 2,12  | 3,15  | 2,07  | –                                    | 480  | 260   |
| 612,4               | 717,6         | 2,5           | 1 960               | 5 300                   | 0,12                | 5,78  | 8,61  | 5,65  | 350                                  | 600  | –   |
| 612,4               | 717,6         | 2,5           | 1 960               | 5 300                   | 0,12                | 5,78  | 8,61  | 5,65  | 350                                  | 600  | –   |
| 612,4               | 717,6         | 2,5           | 2 550               | 7 350                   | 0,15                | 4,4   | 6,56  | 4,31  | 440                                  | 530  | –   |
| 612,4               | 717,6         | 2,5           | 2 550               | 7 350                   | 0,15                | 4,4   | 6,56  | 4,31  | 440                                  | 530  | –   |

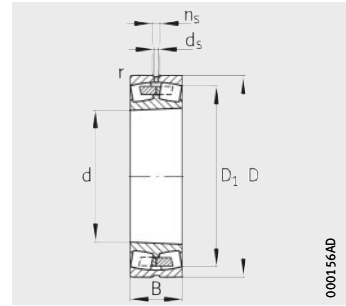


# Spherical roller bearings

Cylindrical or tapered bore



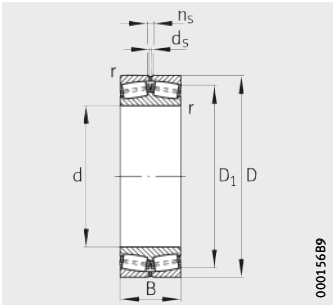
Design 2  
With central rib  
Cylindrical bore



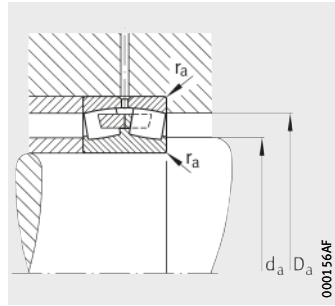
With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

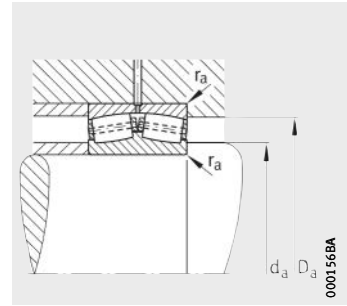
| Designation        | Design | Mass<br>m<br>≈kg | Dimensions |      |     |           |                     |                |                |
|--------------------|--------|------------------|------------|------|-----|-----------|---------------------|----------------|----------------|
|                    |        |                  | d          | D    | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 239/600-B-K-MB     | 2      | 210              | 600        | 800  | 150 | 5         | 740,5               | 12,5           | 23,5           |
| 239/600-B-MB       | 2      | 224              | 600        | 800  | 150 | 5         | 740,5               | 12,5           | 23,5           |
| Z-528744.PRL       | 2      | 281              | 600        | 800  | 200 | 5         | 736,1               | 9,5            | 17,7           |
| Z-541824.249/600-B | 3      | 294              | 600        | 800  | 200 | 5         | 736,1               | 9,5            | 17,7           |
| 249/600-K30-MB     | 2      | 293              | 600        | 800  | 200 | 5         | 736,1               | 9,5            | 17,7           |
| 249/600-MB         | 2      | 293              | 600        | 800  | 200 | 5         | 736,1               | 9,5            | 17,7           |
| 230/600-B-K-MB     | 2      | 388              | 600        | 870  | 200 | 6         | 791,9               | 12,5           | 23,5           |
| 230/600-B-MB       | 2      | 409              | 600        | 870  | 200 | 6         | 791,9               | 12,5           | 23,5           |
| 240/600-B-K30-MB   | 2      | 544              | 600        | 870  | 272 | 6         | 773,3               | 12,5           | 23,5           |
| 240/600-B-MB       | 2      | 553              | 600        | 870  | 272 | 6         | 773,3               | 12,5           | 23,5           |
| 231/600-K-MB       | 2      | 901              | 600        | 980  | 300 | 7,5       | 852,6               | 12,5           | 23,5           |
| 231/600-MB         | 2      | 929              | 600        | 980  | 300 | 7,5       | 852,6               | 12,5           | 23,5           |
| 241/600-B-K30-MB   | 2      | 1170             | 600        | 980  | 375 | 7,5       | 833                 | 12,5           | 23,5           |
| 241/600-B-MB       | 2      | 1180             | 600        | 980  | 375 | 7,5       | 833                 | 12,5           | 23,5           |
| 222/600-MB         | 2      | 1170             | 600        | 1090 | 280 | 9,5       | 947,7               | 12,5           | 23,5           |
| 232/600-B-K-MB     | 2      | 1560             | 600        | 1090 | 388 | 9,5       | 919,5               | 12,5           | 23,5           |
| 232/600-B-MB       | 2      | 1600             | 600        | 1090 | 388 | 9,5       | 919,5               | 12,5           | 23,5           |
| 223/600-B-MB       | 2      | 2060             | 600        | 1220 | 355 | 15        | 1036,1              | 12,5           | 23,5           |
| 223/600-MB         | 2      | 2200             | 600        | 1220 | 355 | 15        | 1036,1              | 12,5           | 23,5           |
| 238/630-MB         | 2      | 122              | 630        | 780  | 112 | 4         | 736,8               | 8              | 15             |
| 238/630-K-MB       | 2      | 122              | 630        | 780  | 112 | 4         | 736,8               | 8              | 15             |
| 239/630-B-K-MB     | 2      | 283              | 630        | 850  | 165 | 6         | 784,5               | 12,5           | 23,5           |
| 239/630-B-MB       | 2      | 292              | 630        | 850  | 165 | 6         | 784,5               | 12,5           | 23,5           |
| 249/630-K30-MB     | 2      | 363              | 630        | 850  | 218 | 6         | 780,2               | 9,5            | 17,7           |
| 249/630-MB         | 2      | 363              | 630        | 850  | 218 | 6         | 780,2               | 9,5            | 17,7           |
| Z-541825.249/630   | 3      | 375              | 630        | 850  | 218 | 6         | 780,2               | 9,5            | 17,7           |
| 230/630-B-K-MB     | 2      | 480              | 630        | 920  | 212 | 7,5       | 834,3               | 12,5           | 23,5           |
| 230/630-B-MB       | 2      | 495              | 630        | 920  | 212 | 7,5       | 834,3               | 12,5           | 23,5           |
| 240/630-B-K30-MB   | 2      | 649              | 630        | 920  | 290 | 7,5       | 817,9               | 12,5           | 23,5           |
| 240/630-B-MB       | 2      | 660              | 630        | 920  | 290 | 7,5       | 817,9               | 12,5           | 23,5           |
| 231/630-B-K-MB     | 2      | 1040             | 630        | 1030 | 315 | 7,5       | 896,2               | 12,5           | 23,5           |
| 231/630-B-MB       | 2      | 1070             | 630        | 1030 | 315 | 7,5       | 896,2               | 12,5           | 23,5           |
| 241/630-B-K30-MB   | 2      | 1360             | 630        | 1030 | 400 | 7,5       | 872,2               | 12,5           | 23,5           |
| 241/630-B-MB       | 2      | 1390             | 630        | 1030 | 400 | 7,5       | 872,2               | 12,5           | 23,5           |



Design 3  
Cylindrical bore with pin cage

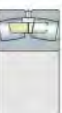


Design 2  
Mounting dimensions



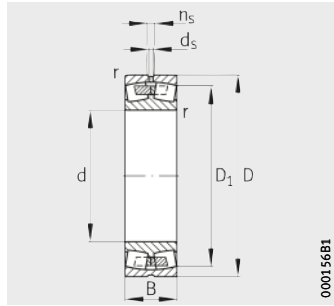
Design 3  
Mounting dimensions

| Mounting dimensions    |                        |                        | Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load<br>C <sub>ur</sub><br>kN | Limiting speed<br>n <sub>G</sub><br>min <sup>-1</sup> | Reference speed<br>n <sub>B</sub><br>min <sup>-1</sup> |
|------------------------|------------------------|------------------------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|---|---|--|
| d <sub>a</sub><br>min. | D <sub>a</sub><br>max. | r <sub>a</sub><br>max. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> |   |   |  |
| 618                    | 782                    | 4                      | 3 450                        | 8 650                          | 0,17                | 3,95           | 5,88           | 3,86           | 630   | 560   | 430  |
| 618                    | 782                    | 4                      | 3 450                        | 8 650                          | 0,17                | 3,95           | 5,88           | 3,86           | 630   | 560   | 430  |
| 645                    | 755                    | 4                      | 4 300                        | 10 800                         | 0,21                | 3,2            | 4,77           | 3,13           | 670   | 500   | –  |
| 618                    | 755                    | 4                      | 5 000                        | 12 900                         | 0,22                | 3,07           | 4,57           | 3              | 520   | 500   | –  |
| 618                    | 782                    | 4                      | 4 650                        | 11 800                         | 0,23                | 2,92           | 4,35           | 2,86           | 680   | 500   | –  |
| 618                    | 782                    | 4                      | 4 650                        | 11 800                         | 0,23                | 2,92           | 4,35           | 2,86           | 680   | 500   | –  |
| 623                    | 847                    | 5                      | 5 700                        | 12 500                         | 0,22                | 3,07           | 4,57           | 3              | 890   | 530   | 405  |
| 623                    | 847                    | 5                      | 5 700                        | 12 500                         | 0,22                | 3,07           | 4,57           | 3              | 890   | 530   | 405  |
| 623                    | 847                    | 5                      | 7 100                        | 16 600                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 200                                       | 630   | 285  |
| 623                    | 847                    | 5                      | 7 100                        | 16 600                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 200                                       | 630   | 285  |
| 632                    | 948                    | 6                      | 9 000                        | 19 300                         | 0,31                | 2,2            | 3,27           | 2,15           | 810   | 500   | 270  |
| 632                    | 948                    | 6                      | 9 000                        | 19 300                         | 0,31                | 2,2            | 3,27           | 2,15           | 810   | 500   | 270  |
| 632                    | 948                    | 6                      | 11 600                       | 26 000                         | 0,38                | 1,79           | 2,67           | 1,75           | 1 780                                       | 450   | 149  |
| 632                    | 948                    | 6                      | 11 600                       | 26 000                         | 0,38                | 1,79           | 2,67           | 1,75           | 1 780                                       | 450   | 149  |
| 640                    | 1 050                  | 8                      | 9 650                        | 17 600                         | 0,27                | 2,47           | 3,67           | 2,41           | –   | 480   | 340  |
| 640                    | 1 050                  | 8                      | 12 900                       | 25 500                         | 0,37                | 1,83           | 2,72           | 1,79           | 1 740                                       | 480   | 190  |
| 640                    | 1 050                  | 8                      | 12 900                       | 25 500                         | 0,37                | 1,83           | 2,72           | 1,79           | 1 740                                       | 480   | 190  |
| 658                    | 1 162                  | 12                     | 13 200                       | 22 800                         | 0,32                | 2,13           | 3,17           | 2,08           | 1 580                                       | 450   | 240  |
| 658                    | 1 162                  | 12                     | 13 200                       | 22 800                         | 0,32                | 2,13           | 3,17           | 2,08           | 1 580                                       | 450   | 240  |
| 644,6                  | 765,4                  | 3                      | 2 280                        | 6 400                          | 0,12                | 5,51           | 8,21           | 5,39           | 455   | 560   | –  |
| 644,6                  | 765,4                  | 3                      | 2 280                        | 6 400                          | 0,12                | 5,51           | 8,21           | 5,39           | 455   | 560   | –  |
| 653                    | 827                    | 5                      | 4 050                        | 9 800                          | 0,18                | 3,8            | 5,66           | 3,72           | 710   | 530   | 405  |
| 653                    | 827                    | 5                      | 4 050                        | 9 800                          | 0,18                | 3,8            | 5,66           | 3,72           | 710   | 530   | 405  |
| 653                    | 827                    | 5                      | 5 300                        | 13 400                         | 0,24                | 2,81           | 4,19           | 2,75           | –   | 480   | –  |
| 653                    | 827                    | 5                      | 5 300                        | 13 400                         | 0,24                | 2,81           | 4,19           | 2,75           | –   | 480   | –  |
| 653                    | 805                    | 5                      | 6 000                        | 15 600                         | 0,22                | 3,01           | 4,48           | 2,94           | 850   | 480   | –  |
| 658                    | 892                    | 6                      | 6 300                        | 13 700                         | 0,22                | 3,01           | 4,48           | 2,94           | 890   | 500   | 380  |
| 658                    | 892                    | 6                      | 6 300                        | 13 700                         | 0,22                | 3,01           | 4,48           | 2,94           | 890   | 500   | 380  |
| 658                    | 892                    | 6                      | 8 000                        | 19 000                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 350                                       | 480   | 260  |
| 658                    | 892                    | 6                      | 8 000                        | 19 000                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 350                                       | 480   | 260  |
| 662                    | 998                    | 6                      | 9 800                        | 20 800                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 430                                       | 480   | 260  |
| 662                    | 998                    | 6                      | 9 800                        | 20 800                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 430                                       | 480   | 260  |
| 662                    | 998                    | 6                      | 12 900                       | 29 000                         | 0,38                | 1,78           | 2,65           | 1,74           | 1 960                                       | 450   | 136  |
| 662                    | 998                    | 6                      | 12 900                       | 29 000                         | 0,38                | 1,78           | 2,65           | 1,74           | 1 960                                       | 450   | 140  |

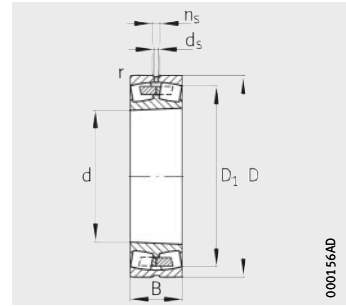


# Spherical roller bearings

Cylindrical or tapered bore



Design 2  
With central rib  
Cylindrical bore



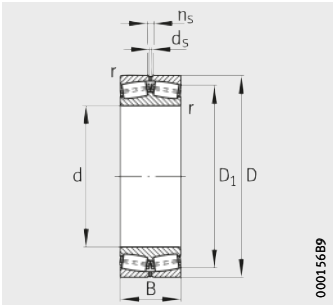
With central rib  
K = taper 1:12  
K30 = taper 1:30

**Dimension table** (continued) · Dimensions in mm

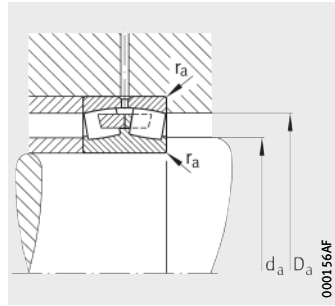
| Designation        | Design | Mass<br>m<br>≈ kg | Dimensions |       |     |                       |                     |                |                |
|--------------------|--------|-------------------|------------|-------|-----|-----------------------|---------------------|----------------|----------------|
|                    |        |                   | d          | D     | B   | r<br>min.             | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 222/630-MB         | 2      | 1 420             | 630        | 1 150 | 300 | 12                    | 998,2               | 12,5           | 23,5           |
| 232/630-B-K-MB     | 2      | 1 885             | 630        | 1 150 | 412 | 12                    | 969,2               | 12,5           | 23,5           |
| 232/630-B-MB       | 2      | 1 940             | 630        | 1 150 | 412 | 12                    | 969,2               | 12,5           | 23,5           |
| 238/670-B-MB       | 2      | 120               | 670        | 820   | 112 | 4                     | 777,2               | 8              | 15             |
| 238/670-B-K-MB     | 2      | 120               | 670        | 820   | 112 | 4                     | 777,2               | 8              | 15             |
| 248/670-B-K30-MB   | 2      | 175               | 670        | 820   | 150 | 4                     | 775,2               | 8              | 15             |
| 248/670-B-MB       | 2      | 175               | 670        | 820   | 150 | 4                     | 775,2               | 8              | 15             |
| 239/670-B-K-MB     | 2      | 310               | 670        | 900   | 170 | 6                     | 831,5               | 12,5           | 23,5           |
| 239/670-B-MB       | 2      | 320               | 670        | 900   | 170 | 6                     | 831,5               | 12,5           | 23,5           |
| Z-528746.PRL       | 2      | 418               | 670        | 900   | 230 | 7,5                   | 826,5               | 12,5           | 23,5           |
| 249/670-B-K30-MB   | 2      | 433               | 670        | 900   | 230 | 6                     | 826,5               | 12,5           | 23,5           |
| 249/670-B-MB       | 2      | 433               | 670        | 900   | 230 | 6                     | 826,5               | 12,5           | 23,5           |
| Z-541826.249/670   | 3      | 435               | 670        | 900   | 230 | 6                     | 826,5               | 12,5           | 23,5           |
| 230/670-B-K-MB     | 2      | 590               | 670        | 980   | 230 | 7,5                   | 888,7               | 12,5           | 23,5           |
| 230/670-B-MB       | 2      | 600               | 670        | 980   | 230 | 7,5                   | 888,7               | 12,5           | 23,5           |
| 240/670-B-K30-MB   | 2      | 794               | 670        | 980   | 308 | 7,5                   | 873,1               | 12,5           | 23,5           |
| 240/670-B-MB       | 2      | 813               | 670        | 980   | 308 | 7,5                   | 873,1               | 12,5           | 23,5           |
| 231/670-B-K-MB     | 2      | 1 240             | 670        | 1 090 | 336 | 7,5                   | 948,2               | 12,5           | 23,5           |
| 241/670-B-K30-MB   | 2      | 1 540             | 670        | 1 090 | 412 | 7,5                   | 929,4               | 12,5           | 23,5           |
| 241/670-B-MB       | 2      | 1 540             | 670        | 1 090 | 412 | 7,5                   | 929,4               | 12,5           | 23,5           |
| F-804529.PRL       | 2, K30 | 1 660             | 670        | 1 090 | 445 | 2,8/7,5 <sup>1)</sup> | 913,8               | 12,5           | 23,5           |
| 222/670-MB         | 2      | 1 730             | 670        | 1 220 | 315 | 12                    | 1 061               | 12,5           | 23,5           |
| 232/670-B-K-MB     | 2      | 2 240             | 670        | 1 220 | 438 | 12                    | 1 030,5             | 12,5           | 23,5           |
| 232/670-B-MB       | 2      | 2 320             | 670        | 1 220 | 438 | 12                    | 1 030,5             | 12,5           | 23,5           |
| 238/710-K-MB       | 2      | 139               | 710        | 870   | 118 | 4                     | 824,9               | 8              | 15             |
| 238/710-MB         | 2      | 154               | 710        | 870   | 118 | 4                     | 824,9               | 8              | 15             |
| 248/710-B-MB       | 2      | 215               | 710        | 870   | 160 | 4                     | 821,2               | 8              | 15             |
| 248/710-B-K30-MB   | 2      | 218               | 710        | 870   | 160 | 4                     | 821,2               | 8              | 15             |
| 239/710-K-MB       | 2      | 336               | 710        | 950   | 180 | 6                     | 877,5               | 12,5           | 23,5           |
| 239/710-MB         | 2      | 355               | 710        | 950   | 180 | 6                     | 877,5               | 12,5           | 23,5           |
| Z-528747.PRL       | 2      | 491               | 710        | 950   | 243 | 6                     | 871,7               | 12,5           | 23,5           |
| 249/710-B-MB       | 2      | 494               | 710        | 950   | 243 | 6                     | 871,7               | 12,5           | 23,5           |
| 249/710-B-K30-MB   | 2      | 505               | 710        | 950   | 243 | 6                     | 871,7               | 12,5           | 23,5           |
| Z-541827.249/710-B | 3      | 526               | 710        | 950   | 243 | 6                     | 871,7               | 12,5           | 23,5           |

<sup>1)</sup> Chamfer dimension on inner ring = 2,8 mm, chamfer dimension on outer ring = 7,5 mm.

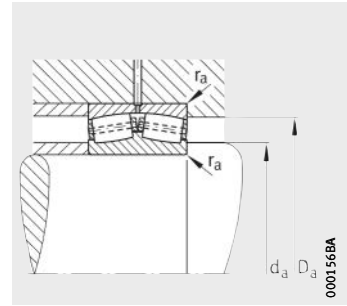




Design 3  
Cylindrical bore with pin cage

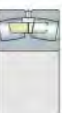


Design 2  
Mounting dimensions



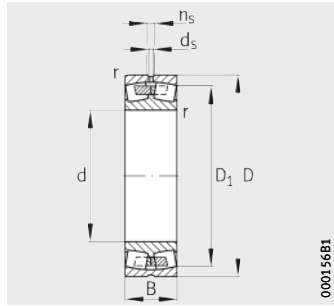
Design 3  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 678                 | 1 102         | 10            | 11 000              | 20 000                  | 0,28                | 2,43  | 3,61  | 2,37  | 1 320                                | 450  | 320   |
| 678                 | 1 102         | 10            | 14 300              | 28 500                  | 0,37                | 1,8   | 2,69  | 1,76  | 1 370                                | 450  | 180   |
| 678                 | 1 102         | 10            | 14 300              | 28 500                  | 0,37                | 1,8   | 2,69  | 1,76  | 1 370                                | 450  | 180   |
| 684,6               | 805,4         | 3             | 2 360               | 6 950                   | 0,12                | 5,72  | 8,51  | 5,59  | 445                                  | 530  | –   |
| 684,6               | 805,4         | 3             | 2 360               | 6 950                   | 0,12                | 5,72  | 8,51  | 5,59  | 445                                  | 530  | –   |
| 684,6               | 805,4         | 3             | 3 350               | 9 800                   | 0,16                | 4,22  | 6,29  | 4,13  | 590                                  | 480  | –   |
| 684,6               | 805,4         | 3             | 3 350               | 9 800                   | 0,16                | 4,22  | 6,29  | 4,13  | 590                                  | 480  | –   |
| 693                 | 877           | 5             | 4 300               | 10 600                  | 0,17                | 3,95  | 5,88  | 3,86  | 750                                  | 500  | 375   |
| 693                 | 877           | 5             | 4 300               | 10 600                  | 0,17                | 3,95  | 5,88  | 3,86  | 750                                  | 500  | 375   |
| 720                 | 850           | 6             | 5 500               | 13 700                  | 0,22                | 3,1   | 4,62  | 3,03  | 620                                  | 450  | –   |
| 693                 | 877           | 5             | 5 850               | 15 000                  | 0,24                | 2,81  | 4,19  | 2,75  | 940                                  | 450  | –   |
| 693                 | 877           | 5             | 5 850               | 15 000                  | 0,24                | 2,81  | 4,19  | 2,75  | 940                                  | 450  | –   |
| 693                 | 850           | 5             | 6 550               | 17 000                  | 0,22                | 3,04  | 4,53  | 2,97  | 690                                  | 450  | –   |
| 698                 | 952           | 6             | 7 200               | 16 000                  | 0,22                | 3,01  | 4,48  | 2,94  | 1 100                                | 480  | 350   |
| 698                 | 952           | 6             | 7 200               | 16 000                  | 0,22                | 3,01  | 4,48  | 2,94  | 1 100                                | 480  | 350   |
| 698                 | 952           | 6             | 9 000               | 21 600                  | 0,31                | 2,2   | 3,27  | 2,15  | 1 460                                | 450  | 240   |
| 698                 | 952           | 6             | 9 000               | 21 600                  | 0,31                | 2,2   | 3,27  | 2,15  | 1 460                                | 450  | 240   |
| 702                 | 1 058         | 6             | 11 000              | 24 000                  | 0,31                | 2,21  | 3,29  | 2,16  | 1 560                                | 450  | 220   |
| 702                 | 1 058         | 6             | 14 000              | 31 500                  | 0,37                | 1,83  | 2,72  | 1,79  | 2 110                                | 430  | 127   |
| 702                 | 1 058         | 6             | 14 000              | 31 500                  | 0,37                | 1,83  | 2,72  | 1,79  | 2 110                                | 430  | 130   |
| 682,4               | 1 058         | 2,5/6         | 14 300              | 32 500                  | 0,36                | 1,86  | 2,77  | 1,82  | 2 130                                | 430  | –   |
| 718                 | 1 172         | 10            | 12 200              | 22 400                  | 0,27                | 2,47  | 3,67  | 2,41  | –                                    | 430  | 300   |
| 718                 | 1 172         | 10            | 16 300              | 32 500                  | 0,37                | 1,8   | 2,69  | 1,76  | 2 150                                | 430  | 160   |
| 718                 | 1 172         | 10            | 16 300              | 32 500                  | 0,37                | 1,8   | 2,69  | 1,76  | 2 150                                | 430  | 160   |
| 724,6               | 855,4         | 3             | 2 600               | 7 500                   | 0,12                | 5,72  | 8,51  | 5,59  | 540                                  | 500  | –   |
| 724,6               | 855,4         | 3             | 2 600               | 7 500                   | 0,12                | 5,72  | 8,51  | 5,59  | 540                                  | 500  | –   |
| 725                 | 855           | 3             | 3 750               | 11 000                  | 0,16                | 4,22  | 6,29  | 4,13  | 780                                  | 450  | –   |
| 725                 | 855           | 3             | 3 750               | 11 000                  | 0,16                | 4,22  | 6,29  | 4,13  | 780                                  | 450  | –   |
| 733                 | 927           | 5             | 4 800               | 12 000                  | 0,18                | 3,85  | 5,73  | 3,76  | 720                                  | 480  | 350   |
| 733                 | 927           | 5             | 4 800               | 12 000                  | 0,18                | 3,85  | 5,73  | 3,76  | 720                                  | 480  | 350   |
| 760                 | 900           | 5             | 6 200               | 15 600                  | 0,22                | 3,14  | 4,67  | 3,07  | 630                                  | 450  | –   |
| 733                 | 927           | 5             | 6 550               | 17 000                  | 0,24                | 2,81  | 4,19  | 2,75  | 1 040                                | 450  | –   |
| 733                 | 927           | 5             | 6 550               | 17 000                  | 0,24                | 2,81  | 4,19  | 2,75  | 1 040                                | 450  | –   |
| 733                 | 900           | 5             | 6 800               | 18 000                  | 0,22                | 3,04  | 4,53  | 2,97  | 1 290                                | 450  | –   |

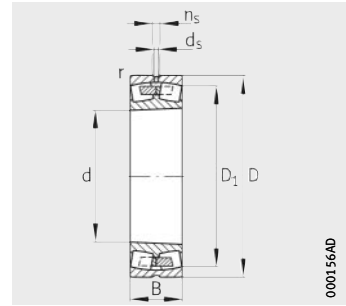


# Spherical roller bearings

Cylindrical or tapered bore



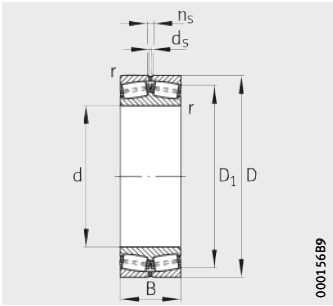
Design 2  
With central rib  
Cylindrical bore



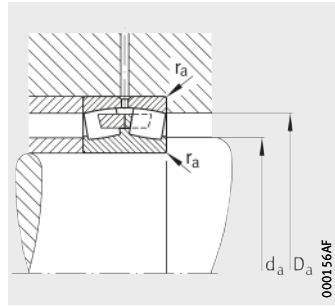
With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

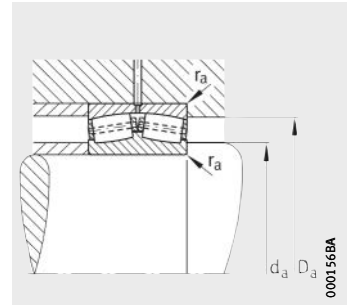
| Designation        | Design | Mass<br>m<br>≈kg | Dimensions |      |     |           |                     |                |                |
|--------------------|--------|------------------|------------|------|-----|-----------|---------------------|----------------|----------------|
|                    |        |                  | d          | D    | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 230/710-B-K-MB     | 2      | 650              | 710        | 1030 | 236 | 7,5       | 938,8               | 12,5           | 23,5           |
| 230/710-B-MB       | 2      | 674              | 710        | 1030 | 236 | 7,5       | 938,8               | 12,5           | 23,5           |
| 240/710-B-K30-MB   | 2      | 873              | 710        | 1030 | 315 | 7,5       | 921,6               | 12,5           | 23,5           |
| 240/710-B-MB       | 2      | 903              | 710        | 1030 | 315 | 7,5       | 921,6               | 12,5           | 23,5           |
| 231/710-B-K-MB     | 2      | 1420             | 710        | 1150 | 345 | 9,5       | 1006,6              | 12,5           | 23,5           |
| 231/710-B-MB       | 2      | 1450             | 710        | 1150 | 345 | 9,5       | 1006,6              | 12,5           | 23,5           |
| 241/710-B-K30-MB   | 2      | 1790             | 710        | 1150 | 438 | 9,5       | 980,2               | 12,5           | 23,5           |
| 241/710-B-MB       | 2      | 1820             | 710        | 1150 | 438 | 9,5       | 980,2               | 12,5           | 23,5           |
| 222/710-MB         | 2      | 1910             | 710        | 1280 | 325 | 12        | 1116,4              | 12,5           | 23,5           |
| 232/710-B-MB       | 2      | 2620             | 710        | 1280 | 450 | 12        | 1088,4              | 12,5           | 23,5           |
| 232/710-B-K-MB     | 2      | 2550             | 710        | 1280 | 450 | 12        | 1088,4              | 12,5           | 23,5           |
| 238/750-B-K-MB     | 2      | 188              | 750        | 920  | 128 | 5         | 872,1               | 8              | 15             |
| 238/750-B-MB       | 2      | 188              | 750        | 920  | 128 | 5         | 872,1               | 8              | 15             |
| 248/750-B-K30-MB   | 2      | 254              | 750        | 920  | 170 | 5         | 868,2               | 8              | 15             |
| 248/750-B-MB       | 2      | 254              | 750        | 920  | 170 | 5         | 868,2               | 8              | 15             |
| 239/750-K-MB       | 2      | 394              | 750        | 1000 | 185 | 6         | 923,2               | 12,5           | 23,5           |
| 239/750-MB         | 2      | 426              | 750        | 1000 | 185 | 6         | 923,2               | 12,5           | 23,5           |
| F-801006.PRL       | 2      | 547              | 750        | 1000 | 250 | 6         | 921,7               | 12,5           | 23,5           |
| Z-528748.PRL       | 2      | 549              | 750        | 1000 | 250 | 6         | 921,8               | 12,5           | 23,5           |
| Z-541828.249/750-B | 3      | 572              | 750        | 1000 | 250 | 6         | 920                 | 12,5           | 23,5           |
| 249/750-B-K30-MB   | 2      | 558              | 750        | 1000 | 250 | 6         | 921,7               | 12,5           | 23,5           |
| 249/750-B-MB       | 2      | 571              | 750        | 1000 | 250 | 6         | 921,7               | 12,5           | 23,5           |
| 230/750-K-MB       | 2      | 786              | 750        | 1090 | 250 | 7,5       | 990,9               | 12,5           | 23,5           |
| 230/750-MB         | 2      | 806              | 750        | 1090 | 250 | 7,5       | 990,9               | 12,5           | 23,5           |
| 240/750-B-MB       | 2      | 1060             | 750        | 1090 | 335 | 7,5       | 976,2               | 12,5           | 23,5           |
| 240/750-B-K30-MB   | 2      | 1070             | 750        | 1090 | 335 | 7,5       | 976,2               | 12,5           | 23,5           |
| 231/750-B-K-MB     | 2      | 1670             | 750        | 1220 | 365 | 9,5       | 1067,4              | 12,5           | 23,5           |
| 231/750-B-MB       | 2      | 1720             | 750        | 1220 | 365 | 9,5       | 1067,4              | 12,5           | 23,5           |
| 241/750-B-MB       | 2      | 2280             | 750        | 1220 | 475 | 9,5       | 1035,8              | 12,5           | 23,5           |
| 241/750-B-K30-MB   | 2      | 2300             | 750        | 1220 | 475 | 9,5       | 1035,8              | 12,5           | 23,5           |
| 222/750-MB         | 2      | 2240             | 750        | 1360 | 345 | 15        | 1185,6              | 12,5           | 23,5           |
| 232/750-B-K-MB     | 2      | 3050             | 750        | 1360 | 475 | 15        | 1154,1              | 12,5           | 23,5           |
| 232/750-B-MB       | 2      | 3140             | 750        | 1360 | 475 | 15        | 1154,1              | 12,5           | 23,5           |



Design 3  
Cylindrical bore with pin cage

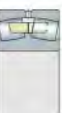


Design 2  
Mounting dimensions



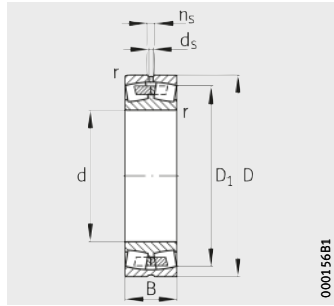
Design 3  
Mounting dimensions

| Mounting dimensions |      |      | Basic load ratings |           | Calculation factors |      |      |      | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|------|------|--------------------|-----------|---------------------|------|------|------|--------------------|-------------------|-------------------|
| da                  | Da   | ra   | dyn. Cr            | stat. C0r | e                   | Y1   | Y2   | Y0   | Cur                | nG                | nB                |
| min.                | max. | max. | kN                 | kN        |                     |      |      |      | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 738                 | 1002 | 6    | 7 650              | 17 000    | 0,22                | 3,07 | 4,57 | 3    | 1 140              | 480               | 325               |
| 738                 | 1002 | 6    | 7 650              | 17 000    | 0,22                | 3,07 | 4,57 | 3    | 1 140              | 480               | 325               |
| 738                 | 1002 | 6    | 9 500              | 22 800    | 0,3                 | 2,26 | 3,37 | 2,21 | 1 550              | 430               | 223               |
| 738                 | 1002 | 6    | 9 500              | 22 800    | 0,3                 | 2,26 | 3,37 | 2,21 | 1 550              | 430               | 220               |
| 750                 | 1110 | 8    | 12 500             | 27 000    | 0,3                 | 2,25 | 3,34 | 2,2  | 1 810              | 450               | 200               |
| 750                 | 1110 | 8    | 12 500             | 27 000    | 0,3                 | 2,25 | 3,34 | 2,2  | 1 810              | 450               | 200               |
| 750                 | 1110 | 8    | 15 600             | 35 500    | 0,38                | 1,79 | 2,67 | 1,75 | 2 340              | 400               | 116               |
| 750                 | 1110 | 8    | 15 600             | 35 500    | 0,38                | 1,79 | 2,67 | 1,75 | 2 340              | 400               | 116               |
| 758                 | 1232 | 10   | 13 700             | 25 000    | 0,27                | 2,49 | 3,71 | 2,43 | –                  | 430               | 280               |
| 758                 | 1232 | 10   | 17 300             | 35 500    | 0,37                | 1,83 | 2,72 | 1,79 | 2 300              | 430               | 150               |
| 758                 | 1232 | 10   | 17 300             | 35 500    | 0,37                | 1,83 | 2,72 | 1,79 | 2 300              | 430               | 150               |
| 768                 | 902  | 4    | 3 000              | 8 650     | 0,12                | 5,61 | 8,36 | 5,49 | 600                | 480               | –                 |
| 768                 | 902  | 4    | 3 000              | 8 650     | 0,12                | 5,61 | 8,36 | 5,49 | 600                | 480               | –                 |
| 768                 | 902  | 4    | 4 150              | 12 500    | 0,16                | 4,11 | 6,12 | 4,02 | 740                | 450               | –                 |
| 768                 | 902  | 4    | 4 150              | 12 500    | 0,16                | 4,11 | 6,12 | 4,02 | 740                | 450               | –                 |
| 773                 | 977  | 5    | 5 200              | 12 900    | 0,17                | 3,95 | 5,88 | 3,86 | 790                | 480               | 325               |
| 773                 | 977  | 5    | 5 200              | 12 900    | 0,17                | 3,95 | 5,88 | 3,86 | 790                | 480               | 325               |
| 773                 | 977  | 5    | 6 700              | 17 000    | 0,21                | 3,2  | 4,77 | 3,13 | 660                | 430               | –                 |
| 800                 | 950  | 5    | 6 700              | 17 000    | 0,21                | 3,2  | 4,77 | 3,13 | 660                | 430               | –                 |
| 773                 | 977  | 5    | 6 950              | 19 600    | 0,2                 | 3,31 | 4,92 | 3,23 | 750                | 430               | –                 |
| 773                 | 977  | 5    | 7 200              | 19 000    | 0,22                | 3,1  | 4,62 | 3,03 | 1 180              | 430               | –                 |
| 773                 | 977  | 5    | 7 200              | 19 000    | 0,22                | 3,1  | 4,62 | 3,03 | 1 180              | 430               | –                 |
| 778                 | 1062 | 6    | 8 500              | 19 000    | 0,22                | 3,01 | 4,48 | 2,94 | 1 010              | 450               | 305               |
| 778                 | 1062 | 6    | 8 500              | 19 000    | 0,22                | 3,01 | 4,48 | 2,94 | 1 010              | 450               | 305               |
| 778                 | 1062 | 6    | 10 800             | 26 000    | 0,3                 | 2,26 | 3,37 | 2,21 | 1 730              | 400               | 200               |
| 778                 | 1062 | 6    | 10 800             | 26 000    | 0,3                 | 2,26 | 3,37 | 2,21 | 1 730              | 400               | 204               |
| 790                 | 1180 | 8    | 14 000             | 30 500    | 0,29                | 2,3  | 3,42 | 2,25 | 1 990              | 430               | 190               |
| 790                 | 1180 | 8    | 14 000             | 30 500    | 0,29                | 2,3  | 3,42 | 2,25 | 1 990              | 430               | 190               |
| 790                 | 1180 | 8    | 18 000             | 40 500    | 0,38                | 1,76 | 2,62 | 1,72 | 2 600              | 300               | 110               |
| 790                 | 1180 | 8    | 18 000             | 40 500    | 0,38                | 1,76 | 2,62 | 1,72 | 2 600              | 300               | 110               |
| 808                 | 1302 | 12   | 14 600             | 27 000    | 0,27                | 2,49 | 3,71 | 2,43 | –                  | 400               | 260               |
| 808                 | 1302 | 12   | 19 300             | 40 000    | 0,37                | 1,83 | 2,72 | 1,79 | 2 550              | 400               | 140               |
| 808                 | 1302 | 12   | 19 300             | 40 000    | 0,37                | 1,83 | 2,72 | 1,79 | 2 550              | 400               | 140               |

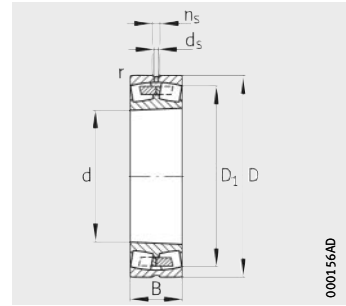


# Spherical roller bearings

Cylindrical or tapered bore



Design 2  
With central rib  
Cylindrical bore



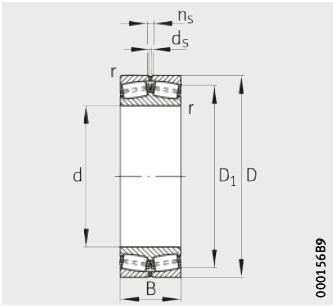
With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

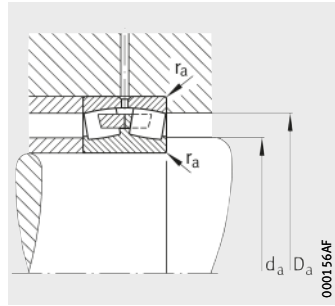
| Designation        | Design | Mass<br>m<br>≈ kg | Dimensions |       |     |                       |                     |                |                |
|--------------------|--------|-------------------|------------|-------|-----|-----------------------|---------------------|----------------|----------------|
|                    |        |                   | d          | D     | B   | r<br>min.             | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 238/800-B-K-MB     | 2      | 226               | 800        | 980   | 136 | 5                     | 927,6               | 8              | 15             |
| 238/800-B-MB       | 2      | 226               | 800        | 980   | 136 | 5                     | 927,6               | 8              | 15             |
| 248/800-B-MB       | 2      | 301               | 800        | 980   | 180 | 5                     | 925,4               | 8              | 15             |
| 248/800-B-K30-MB   | 2      | 399               | 800        | 980   | 180 | 5                     | 925,4               | 8              | 15             |
| 239/800-B-K-MB     | 2      | 490               | 800        | 1 060 | 195 | 6                     | 983,7               | 12,5           | 23,5           |
| 239/800-B-MB       | 2      | 506               | 800        | 1 060 | 195 | 6                     | 983,7               | 12,5           | 23,5           |
| Z-528749.PRL       | 2      | 621               | 800        | 1 060 | 258 | 12/7,5 <sup>1)</sup>  | 978,6               | 12             | 23,5           |
| 249/800-B-K30-MB   | 2      | 650               | 800        | 1 060 | 258 | 6                     | 978,6               | 12,5           | 23,5           |
| 249/800-B-MB       | 2      | 650               | 800        | 1 060 | 258 | 6                     | 978,6               | 12,5           | 23,5           |
| Z-541829.249/800-B | 3      | 646               | 800        | 1 060 | 258 | 7,5                   | 976,5               | 12,5           | 23,5           |
| 230/800-K-MB       | 2      | 861               | 800        | 1 150 | 258 | 7,5                   | 1 050,9             | 12,5           | 23,5           |
| 230/800-MB         | 2      | 899               | 800        | 1 150 | 258 | 7,5                   | 1 050,9             | 12,5           | 23,5           |
| 240/800-B-K30-MB   | 2      | 1 190             | 800        | 1 150 | 345 | 7,5                   | 1 034,1             | 12,5           | 23,5           |
| 240/800-B-MB       | 2      | 1 200             | 800        | 1 150 | 345 | 7,5                   | 1 034,1             | 12,5           | 23,5           |
| 231/800-MB         | 2      | 1 970             | 800        | 1 280 | 375 | 9,5                   | 1 119,1             | 12,5           | 23,5           |
| 231/800-K-MB       | 2      | 2 400             | 800        | 1 280 | 375 | 9,5                   | 1 119,1             | 12,5           | 23,5           |
| 241/800-B-K30-MB   | 2      | 2 530             | 800        | 1 280 | 475 | 9,5                   | 1 099,5             | 12,5           | 23,5           |
| 241/800-B-MB       | 2      | 2 530             | 800        | 1 280 | 475 | 9,5                   | 1 099,5             | 12,5           | 23,5           |
| F-804530.PRL       | 2, K30 | 2 550             | 800        | 1 280 | 511 | 3,3/9,5 <sup>2)</sup> | 1 083               | 12,5           | 23,5           |
| 232/800-B-MB       | 2      | 3 380             | 800        | 1 420 | 488 | 15                    | 1 211,4             | 12,5           | 23,5           |
| 238/850-K-MB       | 2      | 238               | 850        | 1 030 | 136 | 5                     | 978,1               | 8              | 15             |
| 238/850-MB         | 2      | 238               | 850        | 1 030 | 136 | 5                     | 978,1               | 8              | 15             |
| 239/850-K-MB       | 2      | 554               | 850        | 1 120 | 200 | 6                     | 1 039,9             | 12,5           | 23,5           |
| 239/850-MB         | 2      | 579               | 850        | 1 120 | 200 | 6                     | 1 039,9             | 12,5           | 23,5           |
| Z-528750.PRL       | 2      | 719               | 850        | 1 120 | 272 | 6                     | 1 034               | 12,5           | 23,5           |
| Z-541830.249/850-B | 3      | 695               | 850        | 1 120 | 272 | 6                     | 1 033,9             | 12,5           | 23,5           |
| 249/850-B-MB       | 2      | 756               | 850        | 1 120 | 272 | 6                     | 1 033,9             | 12,5           | 23,5           |
| 249/850-B-K30-MB   | 2      | 760               | 850        | 1 120 | 272 | 6                     | 1 033,9             | 12,5           | 23,5           |
| 230/850-B-K-MB     | 2      | 1 060             | 850        | 1 220 | 272 | 7,5                   | 1 113,5             | 12,5           | 23,5           |
| 230/850-B-MB       | 2      | 1 090             | 850        | 1 220 | 272 | 7,5                   | 1 113,5             | 12,5           | 23,5           |
| 240/850-B-K30-MB   | 2      | 1 420             | 850        | 1 220 | 365 | 7,5                   | 1 092,9             | 12,5           | 23,5           |
| 240/850-B-MB       | 2      | 1 440             | 850        | 1 220 | 365 | 7,5                   | 1 092,9             | 12,5           | 23,5           |

1) Chamfer dimension on inner ring = 12 mm, chamfer dimension on outer ring = 7,5 mm.

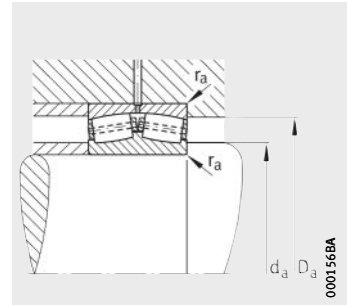
2) Chamfer dimension on inner ring = 3,3 mm, chamfer dimension on outer ring = 9,5 mm.



Design 3  
Cylindrical bore with pin cage

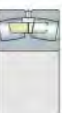


Design 2  
Mounting dimensions



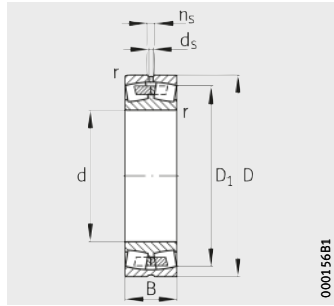
Design 3  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 818                 | 962           | 4             | 3 400               | 10 000                  | 0,12                | 5,72  | 8,51  | 5,59  | 680                                  | 450  | –   |
| 818                 | 962           | 4             | 3 400               | 10 000                  | 0,12                | 5,72  | 8,51  | 5,59  | 680                                  | 450  | –   |
| 818                 | 962           | 4             | 4 650               | 14 000                  | 0,16                | 4,11  | 6,12  | 4,02  | 840                                  | 430  | –   |
| 818                 | 962           | 4             | 4 650               | 14 000                  | 0,16                | 4,11  | 6,12  | 4,02  | 840                                  | 430  | –   |
| 823                 | 1 037         | 5             | 5 850               | 15 000                  | 0,17                | 4,05  | 6,04  | 3,96  | 1 010                                | 450  | 295   |
| 823                 | 1 037         | 5             | 5 850               | 15 000                  | 0,17                | 4,05  | 6,04  | 3,96  | 1 010                                | 450  | 295   |
| 860                 | 1 010         | 10/6          | 7 200               | 18 600                  | 0,2                 | 3,31  | 4,92  | 3,23  | 1 160                                | 400  | –   |
| 823                 | 1 037         | 5             | 7 650               | 20 400                  | 0,23                | 2,98  | 4,44  | 2,92  | 1 340                                | 400  | –   |
| 823                 | 1 037         | 5             | 7 650               | 20 400                  | 0,23                | 2,98  | 4,44  | 2,92  | 1 340                                | 400  | –   |
| 823                 | 1 010         | 6             | 8 300               | 22 800                  | 0,21                | 3,17  | 4,72  | 3,1   | 800                                  | 400  | –   |
| 828                 | 1 122         | 6             | 9 300               | 21 200                  | 0,22                | 3,07  | 4,57  | 3     | 1 430                                | 430  | 280   |
| 828                 | 1 122         | 6             | 9 300               | 21 200                  | 0,22                | 3,07  | 4,57  | 3     | 1 430                                | 430  | 280   |
| 828                 | 1 122         | 6             | 11 600              | 28 500                  | 0,29                | 2,33  | 3,47  | 2,28  | 1 810                                | 360  | 190   |
| 828                 | 1 122         | 6             | 11 600              | 28 500                  | 0,29                | 2,33  | 3,47  | 2,28  | 1 810                                | 360  | 188   |
| 840                 | 1 240         | 8             | 15 000              | 33 500                  | 0,29                | 2,32  | 3,45  | 2,26  | 1 680                                | 400  | 170   |
| 840                 | 1 240         | 8             | 15 000              | 33 500                  | 0,29                | 2,32  | 3,45  | 2,26  | 1 680                                | 400  | 170   |
| 840                 | 1 240         | 8             | 18 600              | 44 000                  | 0,36                | 1,86  | 2,77  | 1,82  | 2 430                                | 340  | 95  |
| 840                 | 1 240         | 8             | 18 600              | 44 000                  | 0,36                | 1,86  | 2,77  | 1,82  | 2 430                                | 340  | 95  |
| 814,6               | 1 240         | 3/8           | 19 300              | 45 500                  | 0,36                | 1,86  | 2,77  | 1,82  | 2 900                                | 340  | –   |
| 858                 | 1 362         | 12            | 20 000              | 41 500                  | 0,36                | 1,87  | 2,79  | 1,83  | 1 940                                | 360  | 130   |
| 868                 | 1 012         | 4             | 3 550               | 10 600                  | 0,11                | 6,06  | 9,02  | 5,92  | 710                                  | 450  | –   |
| 868                 | 1 012         | 4             | 3 550               | 10 600                  | 0,11                | 6,06  | 9,02  | 5,92  | 710                                  | 450  | –   |
| 873                 | 1 097         | 5             | 6 300               | 16 300                  | 0,16                | 4,11  | 6,12  | 4,02  | 960                                  | 430  | 275   |
| 873                 | 1 097         | 5             | 6 300               | 16 300                  | 0,16                | 4,11  | 6,12  | 4,02  | 960                                  | 430  | 275   |
| 910                 | 1 070         | 5             | 7 800               | 20 400                  | 0,21                | 3,27  | 4,87  | 3,2   | 740                                  | 360  | –   |
| 873                 | 1 070         | 5             | 8 300               | 22 400                  | 0,21                | 3,27  | 4,87  | 3,2   | 740                                  | 670  | –   |
| 873                 | 1 097         | 5             | 8 300               | 22 400                  | 0,23                | 2,98  | 4,44  | 2,92  | 1 380                                | 360  | –   |
| 873                 | 1 097         | 5             | 8 300               | 22 400                  | 0,23                | 2,98  | 4,44  | 2,92  | 1 380                                | 360  | –   |
| 878                 | 1 192         | 6             | 10 400              | 23 600                  | 0,22                | 3,07  | 4,57  | 3     | 1 540                                | 400  | 260   |
| 878                 | 1 192         | 6             | 10 400              | 23 600                  | 0,22                | 3,07  | 4,57  | 3     | 1 540                                | 400  | 260   |
| 878                 | 1 192         | 6             | 12 900              | 32 000                  | 0,29                | 2,33  | 3,47  | 2,28  | 2 060                                | 480  | 173   |
| 878                 | 1 192         | 6             | 12 900              | 32 000                  | 0,29                | 2,33  | 3,47  | 2,28  | 2 060                                | 480  | 170   |

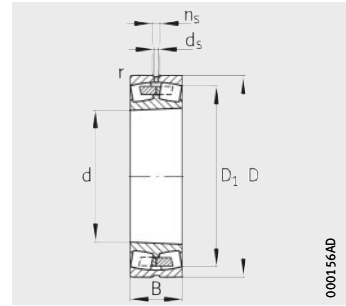


# Spherical roller bearings

Cylindrical or tapered bore



Design 2  
With central rib  
Cylindrical bore

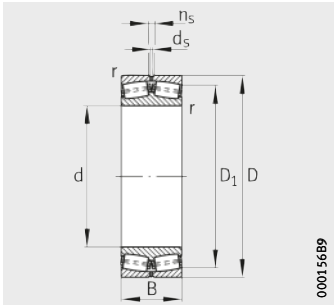


With central rib  
K = taper 1:12  
K30 = taper 1:30

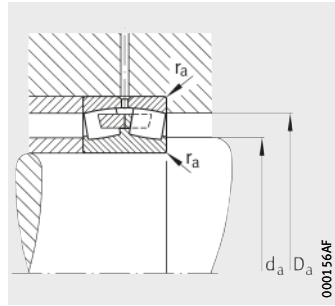
Dimension table (continued) · Dimensions in mm

| Designation        | Design | Mass<br>m<br>≈ kg | Dimensions |       |     |                     |                     |                |                |
|--------------------|--------|-------------------|------------|-------|-----|---------------------|---------------------|----------------|----------------|
|                    |        |                   | d          | D     | B   | r<br>min.           | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 231/850-B-K-MB     | 2      | 2 400             | 850        | 1 360 | 400 | 12                  | 1 198,1             | 12,5           | 23,5           |
| 231/850-B-MB       | 2      | 2 400             | 850        | 1 360 | 400 | 12                  | 1 198,1             | 12,5           | 23,5           |
| 241/850-B-K30-MB   | 2      | 2 840             | 850        | 1 360 | 500 | 12                  | 1 171,7             | 12,5           | 23,5           |
| 241/850-B-MB       | 2      | 2 950             | 850        | 1 360 | 500 | 12                  | 1 171,7             | 12,5           | 23,5           |
| 232/850-B-MB       | 2      | 3 920             | 850        | 1 500 | 515 | 15                  | 1 277,2             | 12,5           | 23,5           |
| 238/900-B-K-MB     | 2      | 274               | 900        | 1 090 | 140 | 5                   | 1 036,1             | 8              | 15             |
| 238/900-B-MB       | 2      | 274               | 900        | 1 090 | 140 | 5                   | 1 036,1             | 8              | 15             |
| 248/900-B-K30-MB   | 2      | 248               | 900        | 1 090 | 190 | 5                   | 1 030,5             | 8              | 15             |
| 248/900-B-MB       | 2      | 382               | 900        | 1 090 | 190 | 5                   | 1 030,5             | 8              | 15             |
| 239/900-K-MB       | 2      | 641               | 900        | 1 180 | 206 | 6                   | 1 098,8             | 12,5           | 23,5           |
| 239/900-MB         | 2      | 653               | 900        | 1 180 | 206 | 6                   | 1 098,8             | 12,5           | 23,5           |
| Z-528751.PRL       | 2      | 816               | 900        | 1 180 | 280 | 9,5/6 <sup>1)</sup> | 1 090,6             | 12,5           | 23,5           |
| 249/900-K30-MB     | 2      | 831               | 900        | 1 180 | 280 | 6                   | 1 088,6             | 12,5           | 23,5           |
| 249/900-MB         | 2      | 831               | 900        | 1 180 | 280 | 6                   | 1 088,6             | 12,5           | 23,5           |
| Z-541831.249/900-B | 3      | 849               | 900        | 1 180 | 280 | 6                   | 1 090,9             | 12,5           | 23,5           |
| 230/900-B-K-MB     | 2      | 1 280             | 900        | 1 280 | 280 | 7,5                 | 1 171,3             | 12,5           | 23,5           |
| 230/900-B-MB       | 2      | 1 280             | 900        | 1 280 | 280 | 7,5                 | 1 171,3             | 12,5           | 23,5           |
| 240/900-B-K30-MB   | 2      | 1 570             | 900        | 1 280 | 375 | 7,5                 | 1 150,7             | 12,5           | 23,5           |
| 240/900-B-MB       | 2      | 1 590             | 900        | 1 280 | 375 | 7,5                 | 1 150,7             | 12,5           | 23,5           |
| 231/900-B-K-MB     | 2      | 2 570             | 900        | 1 420 | 412 | 12                  | 1 252,4             | 12,5           | 23,5           |
| 231/900-B-MB       | 2      | 2 570             | 900        | 1 420 | 412 | 12                  | 1 252,4             | 12,5           | 23,5           |
| 241/900-B-K30-MB   | 2      | 3 040             | 900        | 1 420 | 515 | 12                  | 1 230,4             | 12,5           | 23,5           |
| 241/900-B-MB       | 2      | 3 200             | 900        | 1 420 | 515 | 12                  | 1 230,4             | 12,5           | 23,5           |
| F-807608.PRL       | 2, K30 | 3 340             | 900        | 1 420 | 550 | 9,5                 | 1 211               | 12,5           | 23,5           |
| 238/950-B-K-MB     | 2      | 335               | 950        | 1 150 | 150 | 5                   | 1 092,8             | 8              | 15             |
| 238/950-B-MB       | 2      | 335               | 950        | 1 150 | 150 | 5                   | 1 092,8             | 8              | 15             |
| 239/950-B-K-MB     | 2      | 746               | 950        | 1 250 | 224 | 7,5                 | 1 162,5             | 12,5           | 23,5           |
| Z-528752.PRL       | 2      | 1 000             | 950        | 1 250 | 300 | 7,5                 | 1 152,6             | 12,5           | 23,5           |
| 249/950-B-K30-MB   | 2      | 1 030             | 950        | 1 250 | 300 | 7,5                 | 1 155               | 12,5           | 23,5           |
| 249/950-B-MB       | 2      | 1 030             | 950        | 1 250 | 300 | 7,5                 | 1 155               | 12,5           | 23,5           |
| Z-541832.249/950-B | 3      | 1 040             | 950        | 1 250 | 300 | 7,5                 | 1 155               | 12,5           | 23,5           |
| 240/950-B-K30-MB   | 2      | 1 970             | 950        | 1 360 | 412 | 7,5                 | 1 216               | 12,5           | 23,5           |
| 240/950-B-MB       | 2      | 2 010             | 950        | 1 360 | 412 | 7,5                 | 1 216               | 12,5           | 23,5           |

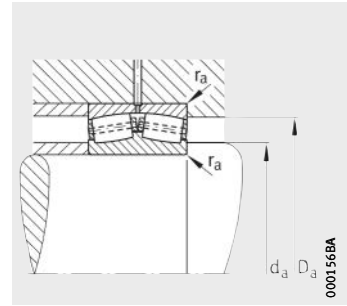
1) Chamfer dimension on inner ring = 9,5 mm, chamfer dimension on outer ring = 6 mm.



Design 3  
Cylindrical bore with pin cage

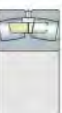


Design 2  
Mounting dimensions



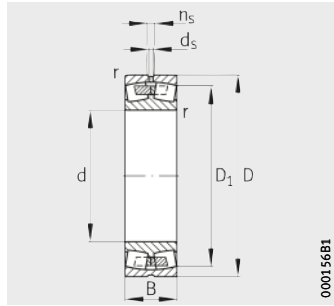
Design 3  
Mounting dimensions

| Mounting dimensions |            |            | Basic load ratings |                    | Calculation factors |      |      |      | Fatigue limit load<br>Cur<br>kN | Limiting speed<br>nG<br>min <sup>-1</sup> | Reference speed<br>nB<br>min <sup>-1</sup> |
|---------------------|------------|------------|--------------------|--------------------|---------------------|------|------|------|---------------------------------|---|--|
| da<br>min.          | Da<br>max. | ra<br>max. | dyn.<br>Cr<br>kN   | stat.<br>C0r<br>kN | e                   | Y1   | Y2   | Y0   |                                 |   |  |
| 898                 | 1312       | 10         | 17 000             | 38 000             | 0,29                | 2,32 | 3,45 | 2,26 | 2 410                           | 360                                       | 160  |
| 898                 | 1312       | 10         | 17 000             | 38 000             | 0,29                | 2,32 | 3,45 | 2,26 | 2 410                           | 360                                       | 160  |
| 898                 | 1312       | 10         | 21 200             | 49 000             | 0,36                | 1,89 | 2,81 | 1,84 | 3 150                           | 300                                       | 90   |
| 898                 | 1312       | 10         | 21 200             | 49 000             | 0,36                | 1,89 | 2,81 | 1,84 | 3 150                           | 300                                       | 90   |
| 908                 | 1442       | 12         | 22 000             | 47 500             | 0,35                | 1,92 | 2,86 | 1,88 | 2 950                           | 340                                       | 120  |
| 918                 | 1072       | 4          | 2 200              | 5 700              | 0,11                | 6,06 | 9,02 | 5,92 | 375                             | 430                                       | –  |
| 918                 | 1072       | 4          | 2 200              | 5 700              | 0,11                | 6,06 | 9,02 | 5,92 | 375                             | 430                                       | –  |
| 918                 | 1072       | 4          | 5 200              | 16 600             | 0,15                | 4,4  | 6,56 | 4,31 | 970                             | 360                                       | –  |
| 918                 | 1072       | 4          | 5 200              | 16 600             | 0,15                | 4,4  | 6,56 | 4,31 | 970                             | 360                                       | –  |
| 923                 | 1157       | 5          | 6 550              | 17 300             | 0,16                | 4,28 | 6,37 | 4,19 | 1 010                           | 400                                       | 260  |
| 923                 | 1157       | 5          | 6 550              | 17 300             | 0,16                | 4,28 | 6,37 | 4,19 | 1 010                           | 400                                       | 260  |
| 960                 | 1120       | 8/5        | 8 500              | 22 400             | 0,2                 | 3,38 | 5,03 | 3,3  | 820                             | 340                                       | –  |
| 923                 | 1157       | 5          | 9 150              | 25 000             | 0,2                 | 3,31 | 4,92 | 3,23 | 1 070                           | 340                                       | –  |
| 923                 | 1157       | 5          | 9 150              | 25 000             | 0,2                 | 3,31 | 4,92 | 3,23 | 1 070                           | 340                                       | –  |
| 923                 | 1157       | 5          | 9 500              | 27 000             | 0,2                 | 3,42 | 5,09 | 3,34 | 890                             | 340                                       | –  |
| 928                 | 1252       | 6          | 11 000             | 26 500             | 0,22                | 3,14 | 4,67 | 3,07 | 1 620                           | 400                                       | 240  |
| 928                 | 1252       | 6          | 11 000             | 26 500             | 0,22                | 3,14 | 4,67 | 3,07 | 1 620                           | 400                                       | 240  |
| 928                 | 1252       | 6          | 14 000             | 36 500             | 0,28                | 2,45 | 3,64 | 2,39 | 2 190                           | 300                                       | 150  |
| 928                 | 1252       | 6          | 14 000             | 36 500             | 0,28                | 2,45 | 3,64 | 2,39 | 2 190                           | 300                                       | 150  |
| 948                 | 1372       | 10         | 18 000             | 40 500             | 0,29                | 2,33 | 3,47 | 2,28 | 2 550                           | 340                                       | 150  |
| 948                 | 1372       | 10         | 18 000             | 40 500             | 0,29                | 2,33 | 3,47 | 2,28 | 2 550                           | 340                                       | 150  |
| 948                 | 1372       | 10         | 22 400             | 53 000             | 0,35                | 1,91 | 2,85 | 1,87 | 2 900                           | 280                                       | 80   |
| 948                 | 1372       | 10         | 22 400             | 53 000             | 0,35                | 1,91 | 2,85 | 1,87 | 2 900                           | 280                                       | 80   |
| 940                 | 1380       | 7,5        | 22 800             | 55 000             | 0,35                | 1,91 | 2,85 | 1,87 | 3 450                           | 430                                       | –  |
| 968                 | 1132       | 4          | 4 150              | 12 900             | 0,11                | 6,06 | 9,02 | 5,92 | –                               | 400                                       | –  |
| 968                 | 1132       | 4          | 4 150              | 12 900             | 0,11                | 6,06 | 9,02 | 5,92 | –                               | 400                                       | –  |
| 978                 | 1222       | 6          | 7 500              | 20 000             | 0,16                | 4,22 | 6,29 | 4,13 | 1 280                           | 360                                       | 240  |
| 1 015               | 1190       | 6          | 9 500              | 25 500             | 0,21                | 3,27 | 4,87 | 3,2  | 980                             | 260                                       | –  |
| 978                 | 1222       | 6          | 10 200             | 28 500             | 0,22                | 3,01 | 4,48 | 2,94 | 1 730                           | 300                                       | –  |
| 978                 | 1222       | 6          | 10 200             | 28 500             | 0,22                | 3,01 | 4,48 | 2,94 | 1 730                           | 300                                       | –  |
| 978                 | 1190       | 6          | 10 600             | 29 000             | 0,2                 | 3,38 | 5,03 | 3,3  | 1 050                           | 300                                       | –  |
| 978                 | 1332       | 6          | 16 300             | 41 500             | 0,29                | 2,32 | 3,45 | 2,26 | 2 550                           | 280                                       | 140  |
| 978                 | 1332       | 6          | 16 300             | 41 500             | 0,29                | 2,32 | 3,45 | 2,26 | 2 550                           | 280                                       | 140  |

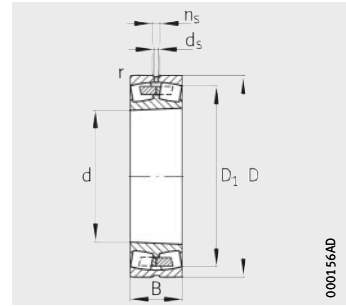


# Spherical roller bearings

Cylindrical or tapered bore



Design 2  
With central rib  
Cylindrical bore

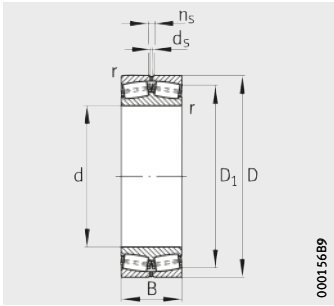


With central rib  
K = taper 1:12  
K30 = taper 1:30

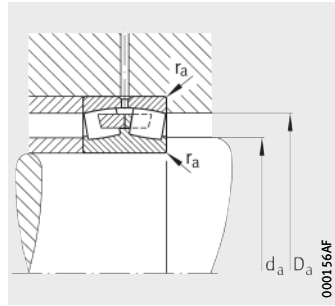
Dimension table (continued) · Dimensions in mm

| Designation         | Design | Mass<br>m<br>≈kg | Dimensions |       |     |           |                     |                |                |
|---------------------|--------|------------------|------------|-------|-----|-----------|---------------------|----------------|----------------|
|                     |        |                  | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 231/950-B-K-MB      | 2      | 3 060            | 950        | 1 500 | 438 | 12        | 1 322,5             | 12,5           | 23,5           |
| 231/950-B-MB        | 2      | 3 060            | 950        | 1 500 | 438 | 12        | 1 322,5             | 12,5           | 23,5           |
| 241/950-B-K30-MB    | 2      | 3 820            | 950        | 1 500 | 545 | 12        | 1 306,7             | 12,5           | 23,5           |
| 241/950-B-MB        | 2      | 3 820            | 950        | 1 500 | 545 | 12        | 1 306,7             | 12,5           | 23,5           |
| 238/1000-MB         | 2      | 425              | 1 000      | 1 220 | 165 | 6         | 1 158               | 9,5            | 17,7           |
| 238/1000-K-MB       | 2      | 425              | 1 000      | 1 220 | 165 | 6         | 1 158               | 9,5            | 17,7           |
| 248/1000-B-MB       | 2      | 535              | 1 000      | 1 220 | 218 | 6         | 1 151,4             | 9,5            | 17,7           |
| 248/1000-B-K30-MB   | 2      | 535              | 1 000      | 1 220 | 218 | 6         | 1 151,4             | 9,5            | 17,7           |
| 239/1000-K-MB       | 2      | 898              | 1 000      | 1 320 | 236 | 7,5       | 1 227,4             | 12,5           | 23,5           |
| 239/1000-MB         | 2      | 898              | 1 000      | 1 320 | 236 | 7,5       | 1 227,4             | 12,5           | 23,5           |
| Z-528753.PRL        | 2      | 1 120            | 1 000      | 1 320 | 315 | 7,5       | 1 218,4             | 12,5           | 23,5           |
| 249/1000-B-MB       | 2      | 1 220            | 1 000      | 1 320 | 315 | 7,5       | 1 218,4             | 12,5           | 23,5           |
| 249/1000-B-K30-MB   | 2      | 1 210            | 1 000      | 1 320 | 315 | 7,5       | 1 218,4             | 12,5           | 23,5           |
| Z-541833.249/1000   | 3      | 1 230            | 1 000      | 1 320 | 315 | 7,5       | 1 218,4             | 12,5           | 23,5           |
| 230/1000-B-K-MB     | 2      | 1 590            | 1 000      | 1 420 | 308 | 7,5       | 1 300,3             | 12,5           | 23,5           |
| 230/1000-B-MB       | 2      | 1 590            | 1 000      | 1 420 | 308 | 7,5       | 1 300,3             | 12,5           | 23,5           |
| 240/1000-B-K30-MB   | 2      | 2 070            | 1 000      | 1 420 | 412 | 7,5       | 1 278,3             | 12,5           | 23,5           |
| 240/1000-B-MB       | 2      | 2 110            | 1 000      | 1 420 | 412 | 7,5       | 1 278,3             | 12,5           | 23,5           |
| 231/1000-B-MB       | 2      | 3 470            | 1 000      | 1 580 | 462 | 12        | 1 391,8             | 12,5           | 23,5           |
| 231/1000-K-MB       | 2      | 3 470            | 1 000      | 1 580 | 462 | 12        | 1 391,8             | 12,5           | 23,5           |
| 241/1000-B-K30-MB   | 2      | 4 380            | 1 000      | 1 580 | 580 | 12        | 1 372,6             | 12,5           | 23,5           |
| 241/1000-B-MB       | 2      | 4 430            | 1 000      | 1 580 | 580 | 12        | 1 372,6             | 12,5           | 23,5           |
| F-809143.02.PRL     | 2, K30 | 4 540            | 1 059      | 1 620 | 615 | 15        | 1 396               | 12,5           | 23,5           |
| 238/1060-B-K-MB     | 2      | 444              | 1 060      | 1 280 | 165 | 6         | 1 218,2             | 9,5            | 17,7           |
| 238/1060-B-MB       | 2      | 444              | 1 060      | 1 280 | 165 | 6         | 1 218,2             | 9,5            | 17,7           |
| 248/1060-B-K30-MB   | 2      | 599              | 1 060      | 1 280 | 218 | 6         | 1 212,7             | 9,5            | 17,7           |
| 248/1060-B-MB       | 2      | 599              | 1 060      | 1 280 | 218 | 6         | 1 212,7             | 9,5            | 17,7           |
| 239/1060-B-K-MB     | 2      | 1 080            | 1 060      | 1 400 | 250 | 7,5       | 1 307,6             | 12,5           | 23,5           |
| 239/1060-B-MB       | 2      | 1 080            | 1 060      | 1 400 | 250 | 7,5       | 1 307,6             | 12,5           | 23,5           |
| Z-541834.249/1060-B | 3      | 1 470            | 1 060      | 1 400 | 335 | 7,5       | 1 290,7             | 12,5           | 23,5           |
| 249/1060-B-K30-MB   | 2      | 1 540            | 1 060      | 1 400 | 335 | 7,5       | 1 290,7             | 12,5           | 23,5           |
| 249/1060-B-MB       | 2      | 1 540            | 1 060      | 1 400 | 335 | 7,5       | 1 290,7             | 12,5           | 23,5           |
| 230/1060-B-K-MB     | 2      | 1 920            | 1 060      | 1 500 | 325 | 9,5       | 1 374,4             | 12,5           | 23,5           |
| 230/1060-B-MB       | 2      | 1 920            | 1 060      | 1 500 | 325 | 9,5       | 1 374,4             | 12,5           | 23,5           |
| 240/1060-B-K30-MB   | 2      | 2 520            | 1 060      | 1 500 | 438 | 9,5       | 1 353,5             | 12,5           | 23,5           |
| 240/1060-B-MB       | 2      | 2 520            | 1 060      | 1 500 | 438 | 9,5       | 1 353,5             | 12,5           | 23,5           |

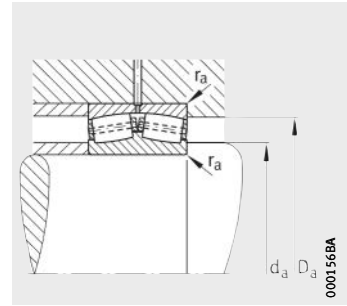




Design 3  
Cylindrical bore with pin cage

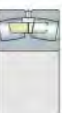


Design 2  
Mounting dimensions



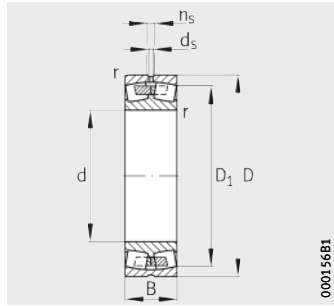
Design 3  
Mounting dimensions

| Mounting dimensions |       |      | Basic load ratings |           | Calculation factors |      |      |      | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|------|--------------------|-----------|---------------------|------|------|------|--------------------|-------------------|-------------------|
| da                  | Da    | ra   | dyn. Cr            | stat. C0r | e                   | Y1   | Y2   | Y0   | Cur                | nG                | nB                |
| min.                | max.  | max. | kN                 | kN        |                     |      |      |      | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 998                 | 1452  | 10   | 20 000             | 45 500    | 0,29                | 2,33 | 3,47 | 2,28 | 2 210              | 300               | 140               |
| 998                 | 1452  | 10   | 20 000             | 45 500    | 0,29                | 2,33 | 3,47 | 2,28 | 2 210              | 300               | 140               |
| 998                 | 1452  | 10   | 23 600             | 54 000    | 0,36                | 1,87 | 2,79 | 1,83 | 1 720              | 260               | 80                |
| 998                 | 1452  | 10   | 23 600             | 54 000    | 0,36                | 1,87 | 2,79 | 1,83 | 1 720              | 260               | 80                |
| 1 023               | 1 197 | 5    | 4 900              | 15 000    | 0,12                | 5,72 | 8,51 | 5,59 | 960                | 360               | –                 |
| 1 023               | 1 197 | 5    | 4 900              | 15 000    | 0,12                | 5,72 | 8,51 | 5,59 | 960                | 360               | –                 |
| 1 023               | 1 197 | 5    | 6 700              | 21 600    | 0,16                | 4,28 | 6,37 | 4,19 | 1 220              | 300               | –                 |
| 1 023               | 1 197 | 5    | 6 700              | 21 600    | 0,16                | 4,28 | 6,37 | 4,19 | 1 220              | 300               | –                 |
| 1 028               | 1 292 | 6    | 8 150              | 21 600    | 0,16                | 4,22 | 6,29 | 4,13 | 1 420              | 340               | 220               |
| 1 028               | 1 292 | 6    | 8 150              | 21 600    | 0,16                | 4,22 | 6,29 | 4,13 | 1 420              | 340               | 220               |
| 1 065               | 1 250 | 6    | 10 400             | 28 000    | 0,2                 | 3,42 | 5,09 | 3,34 | 940                | 630               | –                 |
| 1 028               | 1 292 | 6    | 11 400             | 31 000    | 0,22                | 3,01 | 4,48 | 2,94 | 1 840              | 280               | –                 |
| 1 028               | 1 292 | 6    | 11 400             | 31 000    | 0,22                | 3,01 | 4,48 | 2,94 | 1 840              | 280               | –                 |
| 1 028               | 1 250 | 6    | 12 500             | 35 500    | 0,21                | 3,24 | 4,82 | 3,16 | 2 050              | 280               | –                 |
| 1 028               | 1 392 | 6    | 13 200             | 31 500    | 0,21                | 3,2  | 4,77 | 3,13 | 1 570              | 340               | 200               |
| 1 028               | 1 392 | 6    | 13 200             | 31 500    | 0,21                | 3,2  | 4,77 | 3,13 | 1 570              | 340               | 200               |
| 1 028               | 1 392 | 6    | 16 600             | 42 500    | 0,28                | 2,41 | 3,59 | 2,35 | 2 550              | 260               | 140               |
| 1 028               | 1 392 | 6    | 16 600             | 42 500    | 0,28                | 2,41 | 3,59 | 2,35 | 2 550              | 260               | 140               |
| 1 048               | 1 532 | 10   | 22 000             | 51 000    | 0,29                | 2,33 | 3,47 | 2,28 | 3 150              | 280               | 130               |
| 1 048               | 1 532 | 10   | 22 000             | 51 000    | 0,29                | 2,33 | 3,47 | 2,28 | 3 150              | 280               | 130               |
| 1 048               | 1 532 | 10   | 27 500             | 64 000    | 0,35                | 1,91 | 2,85 | 1,87 | 4 000              | 260               | 70                |
| 1 048               | 1 532 | 10   | 27 500             | 64 000    | 0,35                | 1,91 | 2,85 | 1,87 | 4 000              | 260               | 70                |
| 1 117               | 1 562 | 12   | 27 000             | 65 500    | 0,32                | 2,12 | 3,15 | 2,07 | 3 900              | 260               | 67                |
| 1 083               | 1 257 | 5    | 5 100              | 16 000    | 0,11                | 6,18 | 9,2  | 6,04 | 980                | 340               | –                 |
| 1 083               | 1 257 | 5    | 5 100              | 16 000    | 0,11                | 6,18 | 9,2  | 6,04 | 980                | 340               | –                 |
| 1 083               | 1 257 | 5    | 6 950              | 22 800    | 0,15                | 4,54 | 6,75 | 4,43 | 1 280              | 280               | –                 |
| 1 083               | 1 257 | 5    | 6 950              | 22 800    | 0,15                | 4,54 | 6,75 | 4,43 | 1 280              | 280               | –                 |
| 1 088               | 1 372 | 6    | 9 800              | 26 000    | 0,17                | 4,05 | 6,04 | 3,96 | 1 590              | 300               | 200               |
| 1 088               | 1 372 | 6    | 9 800              | 26 000    | 0,17                | 4,05 | 6,04 | 3,96 | 1 590              | 300               | 200               |
| 1 088               | 1 325 | 6    | 12 700             | 36 500    | 0,2                 | 3,31 | 4,92 | 3,23 | 1 190              | 260               | –                 |
| 1 088               | 1 372 | 6    | 12 900             | 36 000    | 0,21                | 3,17 | 4,72 | 3,1  | 2 270              | 260               | –                 |
| 1 088               | 1 372 | 6    | 12 900             | 36 000    | 0,21                | 3,17 | 4,72 | 3,1  | 2 270              | 260               | –                 |
| 1 094               | 1 466 | 8    | 14 300             | 35 500    | 0,21                | 3,27 | 4,87 | 3,2  | 1 740              | 280               | 240               |
| 1 094               | 1 466 | 8    | 14 300             | 35 500    | 0,21                | 3,27 | 4,87 | 3,2  | 1 740              | 280               | 240               |
| 1 094               | 1 466 | 8    | 18 600             | 50 000    | 0,27                | 2,47 | 3,67 | 2,41 | 2 950              | 260               | 120               |
| 1 094               | 1 466 | 8    | 18 600             | 50 000    | 0,27                | 2,47 | 3,67 | 2,41 | 2 950              | 260               | 120               |

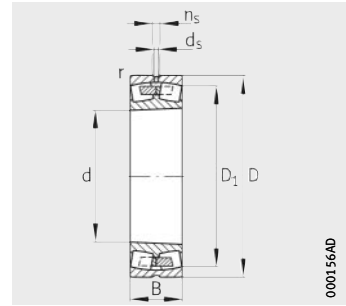


# Spherical roller bearings

Cylindrical or tapered bore



Design 2  
With central rib  
Cylindrical bore

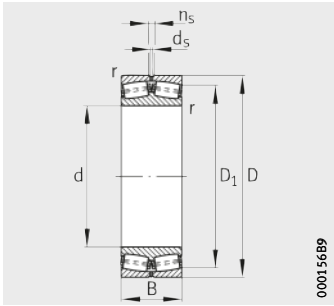


With central rib  
K = taper 1:12  
K30 = taper 1:30

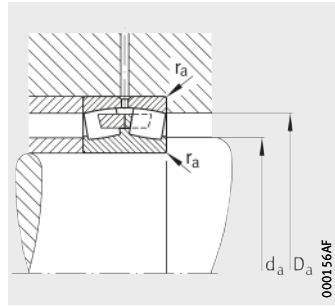
Dimension table (continued) · Dimensions in mm

| Designation                | Design | Mass<br>m<br>≈ kg | Dimensions   |       |     |                      |                     |                |                |
|----------------------------|--------|-------------------|--------------|-------|-----|----------------------|---------------------|----------------|----------------|
|                            |        |                   | d            | D     | B   | r<br>min.            | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| <b>241/1060-B-K30-MB</b>   | 2      | 5 000             | <b>1 060</b> | 1 660 | 600 | 15                   | –                   | 12,5           | 23,5           |
| <b>241/1060-B-MB</b>       | 2      | 5 000             | <b>1 060</b> | 1 660 | 600 | 15                   | –                   | 12,5           | 23,5           |
| <b>238/1120-K-MB</b>       | 2      | 515               | <b>1 120</b> | 1 360 | 180 | 6                    | 1 292,9             | 9,5            | 17,7           |
| <b>238/1120-MB</b>         | 2      | 515               | <b>1 120</b> | 1 360 | 180 | 6                    | 1 292,9             | 9,5            | 17,7           |
| <b>248/1120-B-K30-MB</b>   | 2      | 778               | <b>1 120</b> | 1 360 | 243 | 6                    | 1 285               | 9,5            | 17,7           |
| <b>248/1120-B-MB</b>       | 2      | 778               | <b>1 120</b> | 1 360 | 243 | 6                    | 1 285               | 9,5            | 17,7           |
| <b>239/1120-B-K-MB</b>     | 2      | 1 160             | <b>1 120</b> | 1 460 | 250 | 7,5                  | 1 368,1             | 12,5           | 23,5           |
| <b>239/1120-B-MB</b>       | 2      | 1 160             | <b>1 120</b> | 1 460 | 250 | 7,5                  | 1 368,1             | 12,5           | 23,5           |
| <b>249/1120-B-K30-MB</b>   | 2      | 1 510             | <b>1 120</b> | 1 460 | 335 | 7,5                  | 1 352,5             | 12,5           | 23,5           |
| <b>249/1120-B-MB</b>       | 2      | 1 510             | <b>1 120</b> | 1 460 | 335 | 7,5                  | 1 352,5             | 12,5           | 23,5           |
| <b>Z-541835.249/1120-B</b> | 3      | 1 520             | <b>1 120</b> | 1 460 | 335 | 13/7,5 <sup>1)</sup> | 1 352,5             | 12,5           | 23,5           |
| <b>230/1120-B-K-MB</b>     | 2      | 2 210             | <b>1 120</b> | 1 580 | 345 | 9,5                  | 1 447,7             | 12,5           | 23,5           |
| <b>230/1120-MB</b>         | 2      | 2 210             | <b>1 120</b> | 1 580 | 345 | 9,5                  | 1 447,7             | 12,5           | 23,5           |
| <b>240/1120-B-K30-MB</b>   | 2      | 2 920             | <b>1 120</b> | 1 580 | 462 | 9,5                  | 1 429,7             | 12,5           | 23,5           |
| <b>240/1120-B-MB</b>       | 2      | 2 920             | <b>1 120</b> | 1 580 | 462 | 9,5                  | 1 429,7             | 12,5           | 23,5           |
| <b>F-804636.PRL</b>        | 2      | 2 920             | <b>1 120</b> | 1 580 | 462 | 9,5                  | 1 429,9             | 12,5           | 23,5           |
| <b>241/1120-B-K30-MB</b>   | 2      | 5 800             | <b>1 120</b> | 1 750 | 630 | 15                   | 1 527,2             | 12,5           | 23,5           |
| <b>241/1120-B-MB</b>       | 2      | 5 800             | <b>1 120</b> | 1 750 | 630 | 15                   | 1 527,2             | 12,5           | 23,5           |
| <b>238/1180-B-K-MB</b>     | 2      | 591               | <b>1 180</b> | 1 420 | 180 | 6                    | 1 353,9             | 9,5            | 17,7           |
| <b>238/1180-B-MB</b>       | 2      | 591               | <b>1 180</b> | 1 420 | 180 | 6                    | 1 353,9             | 9,5            | 17,7           |
| <b>248/1180-B-MB</b>       | 2      | 790               | <b>1 180</b> | 1 420 | 243 | 6                    | 1 345               | 9,5            | 17,7           |
| <b>248/1180-B-K30-MB</b>   | 2      | 1 030             | <b>1 180</b> | 1 420 | 243 | 6                    | 1 345               | 9,5            | 17,7           |
| <b>239/1180-B-K-MB</b>     | 2      | 1 340             | <b>1 180</b> | 1 540 | 272 | 7,5                  | 1 438,3             | 12,5           | 23,5           |
| <b>239/1180-B-MB</b>       | 2      | 1 380             | <b>1 180</b> | 1 540 | 272 | 7,5                  | 1 438,3             | 12,5           | 23,5           |
| <b>249/1180-B-K30-MB</b>   | 2      | 2 320             | <b>1 180</b> | 1 540 | 355 | 7,5                  | 1 428,9             | 12,5           | 23,5           |
| <b>249/1180-B-MB</b>       | 2      | 2 320             | <b>1 180</b> | 1 540 | 355 | 7,5                  | 1 428,9             | 12,5           | 23,5           |
| <b>Z-541836.249/1180-B</b> | 3      | 1 750             | <b>1 180</b> | 1 540 | 355 | 7,5                  | 1 428,9             | 12,5           | 23,5           |
| <b>230/1180-B-K-MB</b>     | 2      | 2 510             | <b>1 180</b> | 1 660 | 355 | 9,5                  | 1 523,4             | 12,5           | 23,5           |
| <b>230/1180-MB</b>         | 2      | 2 510             | <b>1 180</b> | 1 660 | 355 | 9,5                  | 1 523,4             | 12,5           | 23,5           |
| <b>241/1180-B-K30-MB</b>   | 2      | 7 040             | <b>1 180</b> | 1 850 | 670 | 15                   | 1 603,9             | 12,5           | 23,5           |
| <b>241/1180-B-MB</b>       | 2      | 7 040             | <b>1 180</b> | 1 850 | 670 | 15                   | 1 603,9             | 12,5           | 23,5           |
| <b>238/1250-K-MB</b>       | 2      | 743               | <b>1 250</b> | 1 500 | 185 | 6                    | 1 429,3             | 9,5            | 17,7           |
| <b>238/1250-MB</b>         | 2      | 743               | <b>1 250</b> | 1 500 | 185 | 6                    | 1 429,3             | 9,5            | 17,7           |
| <b>248/1250-B-K30-MB</b>   | 2      | 918               | <b>1 250</b> | 1 500 | 250 | 6                    | 1 423,5             | 9,5            | 17,7           |
| <b>248/1250-B-MB</b>       | 2      | 918               | <b>1 250</b> | 1 500 | 250 | 6                    | 1 423,5             | 9,5            | 17,7           |

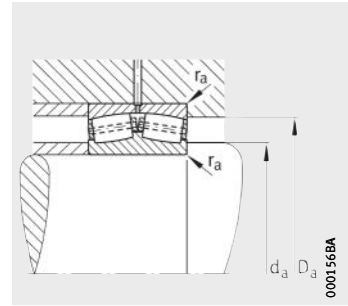
<sup>1)</sup> Chamfer dimension on inner ring = 13 mm, chamfer dimension on outer ring = 7,5 mm.



Design 3  
Cylindrical bore with pin cage

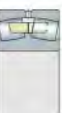


Design 2  
Mounting dimensions



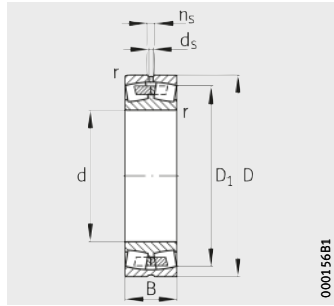
Design 3  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | $e$                 | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 1 118               | 1 602         | 12            | 29 000              | 69 500                  | 0,35                | 1,95  | 2,9   | 1,91  | 4 100                                | 260  | 67  |
| 1 118               | 1 602         | 12            | 29 000              | 69 500                  | 0,35                | 1,95  | 2,9   | 1,91  | 4 100                                | 260  | 67  |
| 1 143               | 1 337         | 5             | 5 850               | 18 300                  | 0,12                | 5,83  | 8,67  | 5,7   | –                                    | 300  | –   |
| 1 143               | 1 337         | 5             | 5 850               | 18 300                  | 0,12                | 5,83  | 8,67  | 5,7   | –                                    | 300  | –   |
| 1 143               | 1 337         | 5             | 8 150               | 27 000                  | 0,16                | 4,28  | 6,37  | 4,19  | 1 490                                | 260  | –   |
| 1 143               | 1 337         | 5             | 8 150               | 27 000                  | 0,16                | 4,28  | 6,37  | 4,19  | 1 490                                | 260  | –   |
| 1 148               | 1 432         | 6             | 10 200              | 27 500                  | 0,16                | 4,28  | 6,37  | 4,19  | 1 740                                | 280  | 190   |
| 1 148               | 1 432         | 6             | 10 200              | 27 500                  | 0,16                | 4,28  | 6,37  | 4,19  | 1 740                                | 280  | 190   |
| 1 148               | 1 432         | 6             | 12 900              | 36 500                  | 0,22                | 3,14  | 4,67  | 3,07  | 1 720                                | 260  | –   |
| 1 148               | 1 432         | 6             | 12 900              | 36 500                  | 0,22                | 3,14  | 4,67  | 3,07  | 1 720                                | 260  | –   |
| 1 195               | 1 385         | 10/6          | 14 300              | 41 500                  | 0,2                 | 3,38  | 5,03  | 3,3   | 1 300                                | 260  | –   |
| 1 154               | 1 546         | 8             | 15 000              | 38 000                  | 0,21                | 3,27  | 4,87  | 3,2   | 2 130                                | 260  | 180   |
| 1 154               | 1 546         | 8             | 15 000              | 38 000                  | 0,21                | 3,27  | 4,87  | 3,2   | 2 130                                | 260  | 180   |
| 1 154               | 1 546         | 8             | 20 800              | 55 000                  | 0,28                | 2,45  | 3,64  | 2,39  | 3 250                                | 260  | 110   |
| 1 154               | 1 546         | 8             | 20 800              | 55 000                  | 0,28                | 2,45  | 3,64  | 2,39  | 3 250                                | 260  | 110   |
| 1 154               | 1 546         | 8             | 20 800              | 55 000                  | 0,28                | 2,45  | 3,64  | 2,39  | 3 250                                | 260  | 110   |
| 1 178               | 1 692         | 12            | 31 000              | 72 000                  | 0,35                | 1,91  | 2,85  | 1,87  | 3 950                                | 240  | 60  |
| 1 178               | 1 692         | 12            | 31 000              | 72 000                  | 0,35                | 1,91  | 2,85  | 1,87  | 3 950                                | 240  | 60  |
| 1 203               | 1 397         | 5             | 6 000               | 19 300                  | 0,11                | 6,18  | 9,2   | 6,04  | 1 110                                | 280  | –   |
| 1 203               | 1 397         | 5             | 6 000               | 19 300                  | 0,11                | 6,18  | 9,2   | 6,04  | 1 110                                | 280  | –   |
| 1 203               | 1 397         | 5             | 8 300               | 28 000                  | 0,15                | 4,54  | 6,75  | 4,43  | 1 550                                | 260  | –   |
| 1 203               | 1 397         | 5             | 8 300               | 28 000                  | 0,15                | 4,54  | 6,75  | 4,43  | 1 550                                | 260  | –   |
| 1 208               | 1 512         | 6             | 11 400              | 31 000                  | 0,17                | 4,05  | 6,04  | 3,96  | 1 760                                | 260  | 180   |
| 1 208               | 1 512         | 6             | 11 400              | 31 000                  | 0,17                | 4,05  | 6,04  | 3,96  | 1 760                                | 260  | 180   |
| 1 208               | 1 512         | 6             | 14 600              | 41 500                  | 0,22                | 3,14  | 4,67  | 3,07  | 2 380                                | 500  | –   |
| 1 208               | 1 512         | 6             | 14 600              | 41 500                  | 0,22                | 3,14  | 4,67  | 3,07  | 2 380                                | 500  | –   |
| 1 260               | 1 460         | 6             | 15 000              | 42 500                  | 0,2                 | 3,42  | 5,09  | 3,34  | 1 470                                | 280  | –   |
| 1 214               | 1 626         | 8             | 16 600              | 41 500                  | 0,21                | 3,27  | 4,87  | 3,2   | 2 400                                | 260  | 170   |
| 1 214               | 1 626         | 8             | 16 600              | 41 500                  | 0,21                | 3,27  | 4,87  | 3,2   | 2 400                                | 260  | 170   |
| 1 238               | 1 792         | 12            | 35 500              | 86 500                  | 0,34                | 1,99  | 2,96  | 1,94  | 4 900                                | 220  | 53  |
| 1 238               | 1 792         | 12            | 35 500              | 86 500                  | 0,34                | 1,99  | 2,96  | 1,94  | 4 900                                | 220  | 53  |
| 1 273               | 1 477         | 5             | 6 400               | 20 800                  | 0,11                | 6,3   | 9,39  | 6,16  | –                                    | 260  | –   |
| 1 273               | 1 477         | 5             | 6 400               | 20 800                  | 0,11                | 6,3   | 9,39  | 6,16  | –                                    | 260  | –   |
| 1 273               | 1 477         | 5             | 9 000               | 30 500                  | 0,14                | 4,67  | 6,96  | 4,57  | 1 230                                | 240  | –   |
| 1 273               | 1 477         | 5             | 9 000               | 30 500                  | 0,14                | 4,67  | 6,96  | 4,57  | 1 230                                | 240  | –   |

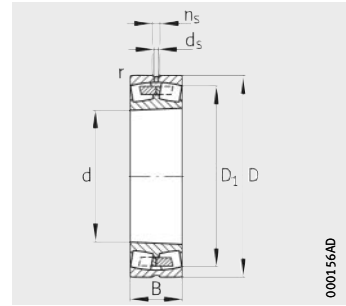


# Spherical roller bearings

Cylindrical or tapered bore



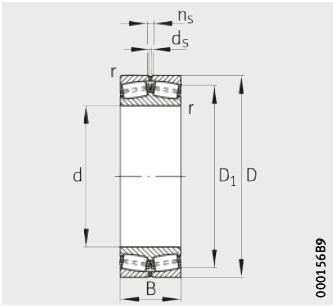
Design 2  
With central rib  
Cylindrical bore



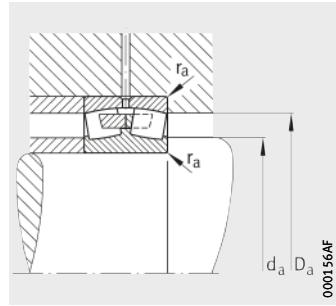
With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

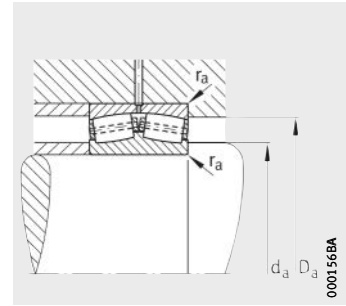
| Designation         | Design | Mass<br>m<br>≈kg | Dimensions   |       |     |           |                     |                |                |
|---------------------|--------|------------------|--------------|-------|-----|-----------|---------------------|----------------|----------------|
|                     |        |                  | d            | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 239/1250-B-K-MB     | 2      | 1 630            | <b>1 250</b> | 1 630 | 280 | 7,5       | 1 516,4             | 12,5           | 23,5           |
| 239/1250-B-MB       | 2      | 1 630            | <b>1 250</b> | 1 630 | 280 | 7,5       | 1 516,4             | 12,5           | 23,5           |
| Z-541837.249/1250-B | 3      | 2 160            | <b>1 250</b> | 1 630 | 375 | 7,5       | 1 510,5             | 12,5           | 23,5           |
| 230/1250-B-K-MB     | 2      | 2 920            | <b>1 250</b> | 1 750 | 375 | 9,5       | 1 607,6             | 12,5           | 23,5           |
| 230/1250-B-MB       | 2      | 2 930            | <b>1 250</b> | 1 750 | 375 | 9,5       | 1 607,6             | 12,5           | 23,5           |
| 240/1250-B-K30-MB   | 2      | 3 640            | <b>1 250</b> | 1 750 | 500 | 9,5       | 1 580,6             | 12,5           | 23,5           |
| 240/1250-B-MB       | 2      | 3 640            | <b>1 250</b> | 1 750 | 500 | 9,5       | 1 580,6             | 12,5           | 23,5           |
| 241/1250-B-K30-MB   | 2      | 8 000            | <b>1 250</b> | 1 950 | 710 | 15        | –                   | 12,5           | 23,5           |
| 241/1250-B-MB       | 2      | 8 000            | <b>1 250</b> | 1 950 | 710 | 15        | –                   | 12,5           | 23,5           |
| 238/1320-B-K-MB     | 2      | 895              | <b>1 320</b> | 1 600 | 206 | 6         | 1 521,4             | 12,5           | 23,5           |
| 238/1320-B-MB       | 2      | 895              | <b>1 320</b> | 1 600 | 206 | 6         | 1 521,4             | 12,5           | 23,5           |
| 248/1320-B-K30-MB   | 2      | 1 230            | <b>1 320</b> | 1 600 | 280 | 7,5       | 1 512,8             | 12,5           | 23,5           |
| 248/1320-B-MB       | 2      | 1 230            | <b>1 320</b> | 1 600 | 280 | 7,5       | 1 512,8             | 12,5           | 23,5           |
| 239/1320-B-K-MB     | 2      | 1 950            | <b>1 320</b> | 1 720 | 300 | 7,5       | 1 602,2             | 12,5           | 23,5           |
| 239/1320-B-MB       | 2      | 1 950            | <b>1 320</b> | 1 720 | 300 | 7,5       | 1 602,2             | 12,5           | 23,5           |
| Z-541838.249/1320-B | 3      | 2 530            | <b>1 320</b> | 1 720 | 400 | 7,5       | 1 592,5             | 12,5           | 23,5           |
| 249/1320-B-K30-MB   | 2      | 2 560            | <b>1 320</b> | 1 720 | 400 | 7,5       | 1 595,5             | 12,5           | 23,5           |
| 249/1320-B-MB       | 2      | 2 560            | <b>1 320</b> | 1 720 | 400 | 7,5       | 1 595,5             | 12,5           | 23,5           |
| 230/1320-MB         | 2      | 3 500            | <b>1 320</b> | 1 850 | 400 | 12        | 1 697,8             | 12,5           | 23,5           |
| 238/1400-B-K-MB     | 2      | 1 110            | <b>1 400</b> | 1 700 | 224 | 7,5       | 1 613,9             | 12,5           | 23,5           |
| 238/1400-B-MB       | 2      | 1 110            | <b>1 400</b> | 1 700 | 224 | 7,5       | 1 613,9             | 12,5           | 23,5           |
| 248/1400-B-K30-MB   | 2      | 1 450            | <b>1 400</b> | 1 700 | 300 | 7,5       | 1 606,9             | 12,5           | 23,5           |
| 248/1400-B-MB       | 2      | 1 470            | <b>1 400</b> | 1 700 | 300 | 7,5       | 1 606,9             | 12,5           | 23,5           |
| 239/1400-B-K-MB     | 2      | 2 200            | <b>1 400</b> | 1 820 | 315 | 9,5       | 1 695,6             | 12,5           | 23,5           |
| 239/1400-B-MB       | 2      | 2 210            | <b>1 400</b> | 1 820 | 315 | 9,5       | 1 695,6             | 12,5           | 23,5           |
| 249/1400-K30-MB     | 2      | 2 930            | <b>1 400</b> | 1 820 | 425 | 9,5       | 1 687,1             | 12,5           | 23,5           |
| 249/1400-MB         | 2      | 2 930            | <b>1 400</b> | 1 820 | 425 | 9,5       | 1 687,1             | 12,5           | 23,5           |
| 230/1400-MB         | 2      | 4 050            | <b>1 400</b> | 1 950 | 412 | 12        | 1 793,5             | 12,5           | 23,5           |
| 240/1400-B-K30-MB   | 2      | 5 170            | <b>1 400</b> | 1 950 | 545 | 12        | 1 766,8             | 12,5           | 23,5           |
| 240/1400-B-MB       | 2      | 5 170            | <b>1 400</b> | 1 950 | 545 | 12        | 1 766,8             | 12,5           | 23,5           |
| 238/1500-K-MB       | 2      | 1 380            | <b>1 500</b> | 1 820 | 243 | 7         | 1 729,3             | 12,5           | 23,5           |
| 238/1500-MB         | 2      | 1 380            | <b>1 500</b> | 1 820 | 243 | 7         | 1 729,3             | 12,5           | 23,5           |
| 248/1500-B-K30-MB   | 2      | 1 660            | <b>1 500</b> | 1 820 | 315 | 7,5       | 1 722,1             | 12,5           | 23,5           |
| 248/1500-B-MB       | 2      | 1 660            | <b>1 500</b> | 1 820 | 315 | 7,5       | 1 722,1             | 12,5           | 23,5           |



Design 3  
Cylindrical bore with pin cage

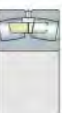


Design 2  
Mounting dimensions



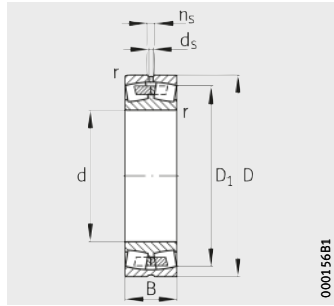
Design 3  
Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue limit load<br>$C_{ur}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |                                      |  |   |
| 1 278               | 1 602         | 6             | 12 000              | 32 500                  | 0,15                | 4,47  | 6,65  | 4,37  | 1 970                                | 260  | 160   |
| 1 278               | 1 602         | 6             | 12 000              | 32 500                  | 0,15                | 4,47  | 6,65  | 4,37  | 1 970                                | 260  | 160   |
| 1 148               | 1 550         | 6             | 16 000              | 50 000                  | 0,19                | 3,5   | 5,21  | 3,42  | 1 530                                | 240  | –   |
| 1 284               | 1 716         | 8             | 18 000              | 46 500                  | 0,2                 | 3,34  | 4,98  | 3,27  | 2 700                                | 260  | 150   |
| 1 284               | 1 716         | 8             | 18 000              | 46 500                  | 0,2                 | 3,34  | 4,98  | 3,27  | 2 700                                | 260  | 150   |
| 1 284               | 1 716         | 8             | 23 200              | 62 000                  | 0,25                | 2,69  | 4     | 2,63  | 3 600                                | 240  | –   |
| 1 284               | 1 716         | 8             | 23 200              | 62 000                  | 0,25                | 2,69  | 4     | 2,63  | 3 600                                | 240  | –   |
| 1 308               | 1 892         | 12            | 37 500              | 91 500                  | 0,34                | 1,99  | 2,96  | 1,94  | 5 100                                | 220  | 50  |
| 1 308               | 1 892         | 12            | 37 500              | 91 500                  | 0,34                | 1,99  | 2,96  | 1,94  | 5 100                                | 220  | 50  |
| 1 343               | 1 577         | 5             | 7 650               | 24 500                  | 0,11                | 6,18  | 9,2   | 6,04  | 1 500                                | 260  | –   |
| 1 343               | 1 577         | 5             | 7 650               | 24 500                  | 0,11                | 6,18  | 9,2   | 6,04  | 1 500                                | 260  | –   |
| 1 343               | 1 577         | 5             | 10 200              | 35 500                  | 0,15                | 4,4   | 6,56  | 4,31  | 1 880                                | 240  | –   |
| 1 343               | 1 577         | 5             | 10 200              | 35 500                  | 0,15                | 4,4   | 6,56  | 4,31  | 1 880                                | 240  | –   |
| 1 348               | 1 692         | 6             | 13 700              | 39 000                  | 0,16                | 4,28  | 6,37  | 4,19  | 2 190                                | 260  | 150   |
| 1 348               | 1 692         | 6             | 13 700              | 39 000                  | 0,16                | 4,28  | 6,37  | 4,19  | 2 190                                | 260  | 150   |
| 1 348               | 1 640         | 6             | 17 300              | 52 000                  | 0,19                | 3,54  | 5,27  | 3,46  | 1 650                                | 220  | –   |
| 1 348               | 1 692         | 6             | 17 600              | 52 000                  | 0,22                | 3,1   | 4,62  | 3,03  | 2 460                                | 220  | –   |
| 1 348               | 1 692         | 6             | 17 600              | 52 000                  | 0,22                | 3,1   | 4,62  | 3,03  | 2 460                                | 220  | –   |
| 1 362               | 1 808         | 10            | 20 400              | 53 000                  | 0,21                | 3,2   | 4,77  | 3,13  | 2 900                                | 240  | 140   |
| 1 428               | 1 672         | 6             | 8 650               | 28 000                  | 0,11                | 5,94  | 8,84  | 5,81  | 1 470                                | 240  | –   |
| 1 428               | 1 672         | 6             | 8 650               | 28 000                  | 0,11                | 5,94  | 8,84  | 5,81  | 1 470                                | 240  | –   |
| 1 428               | 1 672         | 6             | 12 000              | 40 500                  | 0,16                | 4,34  | 6,47  | 4,25  | 2 200                                | 220  | –   |
| 1 428               | 1 672         | 6             | 12 000              | 40 500                  | 0,16                | 4,34  | 6,47  | 4,25  | 2 200                                | 220  | –   |
| 1 434               | 1 786         | 8             | 14 600              | 42 500                  | 0,16                | 4,28  | 6,37  | 4,19  | 2 390                                | 240  | 140   |
| 1 434               | 1 786         | 8             | 14 600              | 42 500                  | 0,16                | 4,28  | 6,37  | 4,19  | 2 390                                | 240  | 140   |
| 1 434               | 1 786         | 8             | 20 000              | 58 500                  | 0,21                | 3,2   | 4,77  | 3,13  | –                                    | 220  | –   |
| 1 434               | 1 786         | 8             | 20 000              | 58 500                  | 0,21                | 3,2   | 4,77  | 3,13  | 2 850                                | 220  | –   |
| 1 442               | 1 908         | 10            | 22 000              | 57 000                  | 0,2                 | 3,34  | 4,98  | 3,27  | –                                    | 220  | 130   |
| 1 442               | 1 908         | 10            | 28 000              | 76 500                  | 0,24                | 2,76  | 4,11  | 2,7   | 4 450                                | 220  | 80  |
| 1 442               | 1 908         | 10            | 28 000              | 76 500                  | 0,24                | 2,76  | 4,11  | 2,7   | 4 450                                | 220  | 80  |
| 1 528               | 1 792         | 6             | 10 000              | 33 500                  | 0,12                | 5,83  | 8,67  | 5,7   | 1 910                                | 220  | –   |
| 1 528               | 1 792         | 6             | 10 000              | 33 500                  | 0,12                | 5,83  | 8,67  | 5,7   | 1 910                                | 220  | –   |
| 1 528               | 1 792         | 6             | 12 900              | 45 000                  | 0,15                | 4,47  | 6,65  | 4,37  | 2 390                                | 220  | –   |
| 1 528               | 1 792         | 6             | 12 900              | 45 000                  | 0,15                | 4,47  | 6,65  | 4,37  | 2 390                                | 220  | –   |

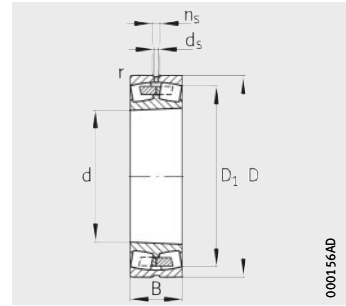


# Spherical roller bearings

Cylindrical or tapered bore



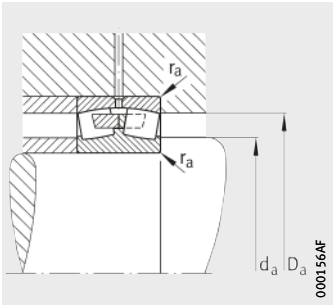
Design 2  
With central rib  
Cylindrical bore



With central rib  
K = taper 1:12  
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

| Designation       | Design | Mass<br>m<br>≈ kg | Dimensions |       |     |           |                     |                |                |
|-------------------|--------|-------------------|------------|-------|-----|-----------|---------------------|----------------|----------------|
|                   |        |                   | d          | D     | B   | r<br>min. | D <sub>1</sub><br>≈ | d <sub>s</sub> | n <sub>s</sub> |
| 239/1500-B-K-MB   | 2      | 2 790             | 1 500      | 1 950 | 335 | 9,5       | 1 817,2             | 12,5           | 23,5           |
| 239/1500-B-MB     | 2      | 2 790             | 1 500      | 1 950 | 335 | 9,5       | 1 817,2             | 12,5           | 23,5           |
| 249/1500-B-K30-MB | 2      | 3 630             | 1 500      | 1 950 | 450 | 9,5       | 1 799,6             | 12,5           | 23,5           |
| 249/1500-B-MB     | 2      | 3 630             | 1 500      | 1 950 | 450 | 9,5       | 1 799,6             | 12,5           | 23,5           |
| 240/1500-B-K30-MB | 2      | 5 840             | 1 500      | 2 120 | 615 | 12        | 1 905,3             | 12,5           | 23,5           |
| 240/1500-B-MB     | 2      | 5 840             | 1 500      | 2 120 | 615 | 12        | 1 905,3             | 12,5           | 23,5           |
| 231/1500-B-K-MB   | 2      | 5 530             | 1 500      | 2 300 | 600 | 15        | 2 060,4             | 12,5           | 23,5           |
| 231/1500-B-MB     | 2      | 5 530             | 1 500      | 2 300 | 600 | 15        | 2 060,4             | 12,5           | 23,5           |
| 241/1500-B-K30-MB | 2      | 12 200            | 1 500      | 2 300 | 800 | 15        | 2 014               | 12,5           | 23,5           |
| 241/1500-B-MB     | 2      | 12 200            | 1 500      | 2 300 | 800 | 15        | 2 014               | 12,5           | 23,5           |
| 238/1600-B-MB     | 2      | 1 770             | 1 600      | 1 950 | 265 | 7,5       | 1 848,5             | 12,5           | 23,5           |
| 248/1600-B-K30-MB | 2      | 2 220             | 1 600      | 1 950 | 345 | 7,5       | 1 846,9             | 12,5           | 23,5           |
| 248/1600-B-MB     | 2      | 2 220             | 1 600      | 1 950 | 345 | 7,5       | 1 846,9             | 12,5           | 23,5           |
| 239/1600-B-MB     | 2      | 3 020             | 1 600      | 2 060 | 345 | 9,5       | 1 919,2             | 12,5           | 23,5           |
| 249/1600-MB       | 2      | 4 710             | 1 600      | 2 060 | 462 | 9,5       | 1 915,4             | 12,5           | 23,5           |
| 238/1700-MB       | 2      | 2 130             | 1 700      | 2 060 | 272 | 7,5       | 1 952,5             | 12,5           | 23,5           |
| 248/1700-MB       | 2      | 3 100             | 1 700      | 2 060 | 355 | 7,5       | 1 946,7             | 12,5           | 23,5           |
| 239/1700-B-MB     | 2      | 3 550             | 1 700      | 2 180 | 355 | 9,5       | 2 030,9             | 12,5           | 23,5           |
| 249/1700-B-MB     | 2      | 5 830             | 1 700      | 2 180 | 475 | 9,5       | 2 029,4             | 12,5           | 23,5           |
| 238/1800-MB       | 2      | 2 440             | 1 800      | 2 180 | 290 | 9,5       | 2 061,1             | 12,5           | 23,5           |
| 248/1800-B-MB     | 2      | 2 840             | 1 800      | 2 180 | 375 | 9,5       | 2 060               | 12,5           | 23,5           |
| 239/1800-MB       | 2      | 4 100             | 1 800      | 2 300 | 375 | 12        | 2 144,5             | 12,5           | 23,5           |
| 249/1800-MB       | 2      | 6 070             | 1 800      | 2 300 | 500 | 12        | 2 140,6             | 12,5           | 23,5           |
| 238/1900-MB       | 2      | 2 860             | 1 900      | 2 300 | 300 | 9,5       | 2 180,8             | 12,5           | 23,5           |
| 248/1900-MB       | 2      | 3 570             | 1 900      | 2 300 | 400 | 9,5       | 2 173,3             | 12,5           | 23,5           |
| 239/1900-MB       | 2      | 4 350             | 1 900      | 2 430 | 400 | 12        | 2 262,6             | 12,5           | 23,5           |
| 249/1900-MB       | 2      | 6 320             | 1 900      | 2 430 | 530 | 12        | 2 261               | 12,5           | 23,5           |
| 238/2000-MB       | 2      | 3 430             | 2 000      | 2 430 | 325 | 9,5       | 2 298,5             | 12,5           | 23,5           |
| 248/2000-B-MB     | 2      | 4 320             | 2 000      | 2 430 | 425 | 9,5       | 2 294,8             | 12,5           | 23,5           |
| F-804544.PRL      | 2, K30 | 2 280             | 2 040      | 2 660 | 400 | 7,5       | 2 457               | 15             | 30             |
| F-804543.PRL      | 2, K30 | 5 190             | 2 100      | 2 625 | 400 | 7,5       | 2 457               | 15             | 30             |



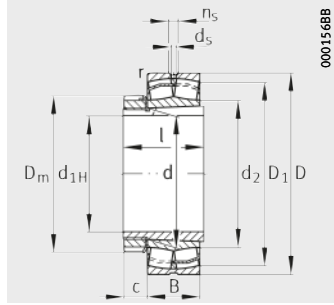
Mounting dimensions

| Mounting dimensions |       |      | Basic load ratings |           | Calculation factors |      |      |      | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|-------|------|--------------------|-----------|---------------------|------|------|------|--------------------|-------------------|-------------------|
| da                  | Da    | ra   | dyn. Cr            | stat. C0r | e                   | Y1   | Y2   | Y0   | Cur                | nG                | nB                |
| min.                | max.  | max. | kN                 | kN        |                     |      |      |      | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 1 534               | 1 916 | 8    | 16 300             | 49 000    | 0,16                | 4,28 | 6,37 | 4,19 | 2 550              | 220               | 130               |
| 1 534               | 1 916 | 8    | 16 300             | 49 000    | 0,16                | 4,28 | 6,37 | 4,19 | 2 550              | 220               | 130               |
| 1 534               | 1 916 | 8    | 21 600             | 67 000    | 0,22                | 3,14 | 4,67 | 3,07 | 2 700              | 200               | –                 |
| 1 534               | 1 916 | 8    | 21 600             | 67 000    | 0,22                | 3,14 | 4,67 | 3,07 | 2 700              | 200               | –                 |
| 1 542               | 2 078 | 10   | 34 000             | 93 000    | 0,26                | 2,64 | 3,93 | 2,58 | 5 400              | 200               | –                 |
| 1 542               | 2 078 | 10   | 34 000             | 93 000    | 0,26                | 2,64 | 3,93 | 2,58 | 5 400              | 200               | –                 |
| 1 558               | 2 242 | 12   | 40 000             | 96 500    | 0,25                | 2,67 | 3,97 | 2,61 | 5 600              | 220               | 67                |
| 1 558               | 2 242 | 12   | 40 000             | 96 500    | 0,25                | 2,67 | 3,97 | 2,61 | 5 600              | 220               | 67                |
| 1 558               | 2 242 | 12   | 45 000             | 110 000   | 0,32                | 2,1  | 3,13 | 2,06 | 5 900              | 220               | 50                |
| 1 558               | 2 242 | 12   | 45 000             | 110 000   | 0,32                | 2,1  | 3,13 | 2,06 | 5 900              | 220               | 50                |
| 1 628               | 1 922 | 6    | 11 600             | 39 000    | 0,12                | 5,72 | 8,51 | 5,59 | 2 060              | 220               | –                 |
| 1 628               | 1 922 | 6    | 16 000             | 54 000    | 0,15                | 4,54 | 6,75 | 4,43 | 3 000              | 200               | –                 |
| 1 628               | 1 922 | 6    | 16 000             | 54 000    | 0,15                | 4,54 | 6,75 | 4,43 | 3 000              | 200               | –                 |
| 1 634               | 2 026 | 8    | 17 300             | 52 000    | 0,15                | 4,6  | 6,85 | 4,5  | 2 850              | 220               | 120               |
| 1 634               | 2 026 | 8    | 23 600             | 73 500    | 0,21                | 3,24 | 4,82 | 3,16 | –                  | 200               | –                 |
| 1 728               | 2 032 | 6    | 12 500             | 42 500    | 0,11                | 5,94 | 8,84 | 5,81 | –                  | 220               | –                 |
| 1 728               | 2 032 | 6    | 17 000             | 60 000    | 0,15                | 4,47 | 6,65 | 4,37 | –                  | 180               | –                 |
| 1 734               | 2 146 | 8    | 19 300             | 60 000    | 0,15                | 4,6  | 6,85 | 4,5  | –                  | 220               | 110               |
| 1 734               | 2 146 | 8    | 25 000             | 78 000    | 0,21                | 3,27 | 4,87 | 3,2  | –                  | 170               | –                 |
| 1 834               | 2 146 | 8    | 14 000             | 47 500    | 0,12                | 5,83 | 8,67 | 5,7  | –                  | 200               | –                 |
| 1 834               | 2 146 | 8    | 18 600             | 67 000    | 0,15                | 4,47 | 6,65 | 4,37 | 3 400              | 170               | –                 |
| 1 842               | 2 258 | 10   | 20 800             | 64 000    | 0,15                | 4,54 | 6,75 | 4,43 | –                  | 200               | 170               |
| 1 842               | 2 258 | 10   | 27 000             | 85 000    | 0,21                | 3,27 | 4,87 | 3,2  | –                  | 150               | –                 |
| 1 842               | 2 258 | 10   | 15 300             | 53 000    | 0,11                | 5,94 | 8,84 | 5,81 | –                  | 180               | –                 |
| 1 934               | 2 266 | 8    | 20 800             | 75 000    | 0,15                | 4,4  | 6,56 | 4,31 | –                  | 150               | –                 |
| 1 934               | 2 266 | 8    | 23 200             | 73 500    | 0,15                | 4,54 | 6,75 | 4,43 | –                  | 180               | 90                |
| 1 942               | 2 388 | 10   | 30 000             | 95 000    | 0,21                | 3,27 | 4,87 | 3,2  | –                  | 140               | –                 |
| 1 942               | 2 388 | 10   | 17 300             | 58 500    | 0,12                | 5,83 | 8,67 | 5,7  | –                  | 170               | –                 |
| 2 034               | 2 396 | 8    | 23 200             | 83 000    | 0,14                | 4,67 | 6,96 | 4,57 | 4 400              | 140               | –                 |
| 2 078               | 2 466 | 6    | 22 400             | 72 000    | 0,13                | 5,14 | 7,66 | 5,03 | 3 700              | 150               | –                 |
| 2 138               | 2 466 | 6    | 22 400             | 72 000    | 0,13                | 5,14 | 7,66 | 5,03 | 3 700              | 150               | –                 |

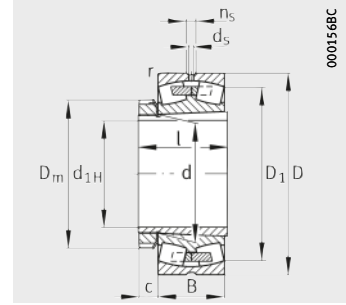


# Spherical roller bearings

With adapter sleeve



E1 design



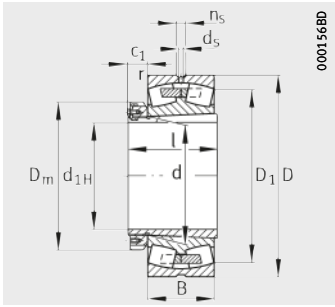
With central rib  
Locknut with tab washer

Dimension table - Dimensions in mm

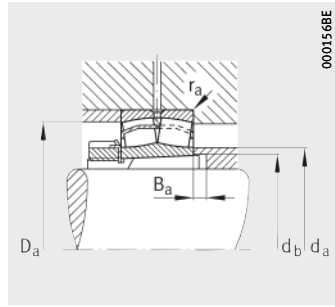
| Designation                |        |                | Mass m  |                | Dimensions      |     |     |     |      |                |                |                |                |                |     |
|----------------------------|--------|----------------|---------|----------------|-----------------|-----|-----|-----|------|----------------|----------------|----------------|----------------|----------------|-----|
| Bearing                    | X-life | Adapter sleeve | Bearing | Adapter sleeve | d <sub>1H</sub> | d   | D   | B   | r    | D <sub>1</sub> | d <sub>2</sub> | d <sub>s</sub> | n <sub>s</sub> | D <sub>m</sub> | l   |
|                            |        |                | ≈kg     | ≈kg            |                 |     |     |     | min. | ≈              | ≈              |                |                |                |     |
| 22330-E1-K                 | XL     | H2330          | 41,2    | 6,76           | 135             | 150 | 320 | 108 | 4    | 273,2          | 185,3          | 9,5            | 17,7           | 195            | 139 |
| 22330-E1-K-T41A            | XL     | H2330          | 41,2    | 6,76           | 135             | 150 | 320 | 108 | 4    | 273,2          | 185,3          | 9,5            | 17,7           | 195            | 139 |
| 22332-K-MB                 | -      | H2332          | 50,1    | 9,32           | 140             | 160 | 340 | 114 | 4    | 288,3          | -              | 9,5            | 17,7           | 210            | 147 |
| 22334-K-MB                 | -      | H2334          | 58,4    | 10,4           | 150             | 170 | 360 | 120 | 4    | 304,2          | -              | 9,5            | 17,7           | 220            | 154 |
| 22236-E1-K                 | XL     | H3136          | 28,5    | 9,67           | 160             | 180 | 320 | 86  | 4    | 285,9          | 211,3          | 9,5            | 17,7           | 230            | 131 |
| 23236-E1A-K-M              | XL     | H2336          | 37      | 11,6           | 160             | 180 | 320 | 112 | 4    | 277,3          | -              | 8              | 15             | 230            | 161 |
| 22336-K-MB                 | -      | H2336          | 66,7    | 11,6           | 160             | 180 | 380 | 126 | 4    | 323,4          | -              | 12,5           | 23,5           | 230            | 161 |
| 23138-E1A-K-M              | XL     | H3138          | 32,4    | 11             | 170             | 190 | 320 | 104 | 3    | 281,6          | -              | 8              | 15             | 240            | 141 |
| 24138-E1-K30 <sup>1)</sup> | XL     | H24138         | 39,5    | 11,9           | 170             | 190 | 320 | 128 | 3    | 269,7          | 217,5          | 6,3            | 12,2           | 240            | 172 |
| 22238-K-MB                 | -      | H3138          | 36,2    | 11             | 170             | 190 | 340 | 92  | 4    | 296            | -              | 9,5            | 17,7           | 240            | 141 |
| 23238-B-K-MB               | -      | H2338          | 46      | 12,9           | 170             | 190 | 340 | 120 | 4    | 291,2          | -              | 9,5            | 17,7           | 240            | 169 |
| 22338-K-MB                 | -      | H2338          | 77,3    | 12,9           | 170             | 190 | 400 | 132 | 5    | 338,2          | -              | 12,5           | 23,5           | 240            | 169 |
| 23140-B-K-MB               | -      | H3140          | 41,7    | 12,3           | 180             | 200 | 340 | 112 | 3    | 293,3          | -              | 9,5            | 17,7           | 250            | 150 |
| 24140-B-K30                | -      | H24140         | 51,6    | 13,4           | 180             | 200 | 340 | 140 | 3    | 285,9          | -              | 6,3            | 12,2           | 250            | 185 |
| 22240-B-K-MB               | -      | H3140          | 42,3    | 12,3           | 180             | 200 | 360 | 98  | 4    | 312            | -              | 9,5            | 17,7           | 250            | 150 |
| 23240-B-K-MB               | -      | H2340          | 55,8    | 14,2           | 180             | 200 | 360 | 128 | 4    | 307,5          | -              | 9,5            | 17,7           | 250            | 176 |
| 22340-K-MB                 | -      | H2340          | 89,5    | 14,2           | 180             | 200 | 420 | 138 | 5    | 357,4          | -              | 12,5           | 23,5           | 250            | 176 |
| 23044-K-MB                 | -      | H3044X         | 30,3    | 10,5           | 200             | 220 | 340 | 90  | 3    | 301,8          | -              | 8              | 15             | 260            | 126 |
| 24044-B-K30-MB             | -      | H24044         | 38,9    | 12,1           | 200             | 220 | 340 | 118 | 3    | 297,4          | -              | 6,3            | 12,2           | 260            | 162 |
| 23144-B-K-MB               | -      | H3144X         | 52      | 15,7           | 200             | 220 | 370 | 120 | 4    | 319,2          | -              | 9,5            | 17,7           | 280            | 161 |
| 24144-B-K30                | -      | H24144         | 64,4    | 17,1           | 200             | 220 | 370 | 150 | 4    | 311,7          | -              | 6,3            | 12,2           | 280            | 199 |
| 22244-B-K-MB               | -      | H3144X         | 59,6    | 15,7           | 200             | 220 | 400 | 108 | 4    | 348,7          | -              | 9,5            | 17,7           | 280            | 161 |
| 23244-K-MB                 | -      | H2344X         | 79      | 17,8           | 200             | 220 | 400 | 144 | 4    | 337,6          | -              | 9,5            | 17,7           | 280            | 186 |
| 22344-K-MB                 | -      | H2344X         | 114     | 17,8           | 200             | 220 | 460 | 145 | 5    | 391,2          | -              | 12,5           | 23,5           | 280            | 186 |
| 23948-K-MB                 | -      | H3948          | 13,4    | 11,3           | 220             | 240 | 320 | 60  | 2,1  | 297,8          | -              | 6,3            | 12,2           | 290            | 101 |
| 23048-K-MB                 | -      | H3048          | 31,9    | 13,8           | 220             | 240 | 360 | 92  | 3    | 322,1          | -              | 8              | 15             | 290            | 133 |
| 24048-B-K30-MB             | -      | H24048         | 43,2    | 15,3           | 220             | 240 | 360 | 118 | 3    | 318,9          | -              | 6,3            | 12,2           | 290            | 167 |
| 23148-B-K-MB               | -      | H3148X         | 65,3    | 18,4           | 220             | 240 | 400 | 128 | 4    | 346,2          | -              | 9,5            | 17,7           | 300            | 172 |
| 24148-B-K30                | -      | H24148         | 78,7    | 19,9           | 220             | 240 | 400 | 160 | 4    | 338            | -              | 6,3            | 12,2           | 300            | 212 |
| 22248-B-K-MB               | -      | H3148X         | 81,2    | 18,4           | 220             | 240 | 440 | 120 | 4    | 380,7          | -              | 12,5           | 23,5           | 300            | 172 |
| 23248-B-K-MB               | -      | H2348X         | 105     | 20,9           | 220             | 240 | 440 | 160 | 4    | 371            | -              | 12,5           | 23,5           | 300            | 199 |
| 22348-K-MB                 | -      | H2348X         | 145     | 20,9           | 220             | 240 | 500 | 155 | 5    | 420            | -              | 12,5           | 23,5           | 300            | 199 |
| 23952-K-MB                 | -      | H3952          | 22,4    | 13,6           | 240             | 260 | 360 | 75  | 2,1  | 330,5          | -              | 8              | 15             | 310            | 116 |
| 23052-K-MB                 | -      | H3052X         | 46,2    | 16             | 240             | 260 | 400 | 104 | 4    | 357,2          | -              | 9,5            | 17,7           | 310            | 145 |
| 24052-B-K30-MB             | -      | H24052         | 64,5    | 18,4           | 240             | 260 | 400 | 140 | 4    | 349,1          | -              | 6,3            | 12,2           | 310            | 190 |

<sup>1)</sup> Cage guidance on inner ring central rib.

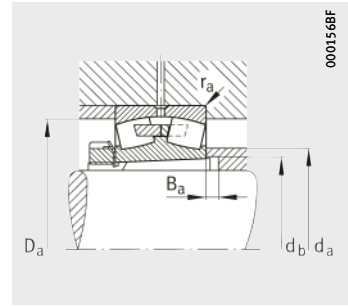




With central rib  
Locknut with retaining bracket



Mounting dimensions  
E1 design



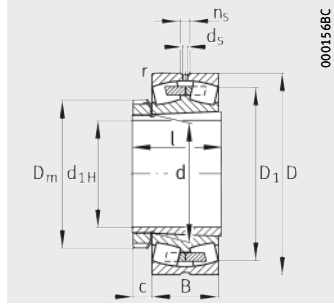
Mounting dimensions  
With central rib

|    |                | Mounting dimensions |                |                |                |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|----|----------------|---------------------|----------------|----------------|----------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| c  | c <sub>1</sub> | d <sub>a</sub>      | D <sub>a</sub> | d <sub>b</sub> | B <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈  | ≈              | max.                | max.           | min.           | min.           | max.           | kN                     | kN                       |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 26 | -              | 185                 | 303            | 163            | 8              | 3              | 1 640                  | 1 850                    | 0,33                | 2,02           | 3              | 1,97           | 148                | 2 200             | 1 520             |
| 26 | -              | 185                 | 303            | 163            | 8              | 3              | 1 640                  | 1 850                    | 0,33                | 2,02           | 3              | 1,97           | 148                | 2 200             | 1 520             |
| 28 | -              | 191                 | 323            | 174            | 8              | 3              | 1 430                  | 1 900                    | 0,37                | 1,8            | 2,69           | 1,76           | 121                | 2 000             | 1 500             |
| 29 | -              | 204                 | 343            | 185            | 8              | 3              | 1 600                  | 2 120                    | 0,37                | 1,83           | 2,72           | 1,79           | 134                | 1 800             | 1 380             |
| 30 | -              | 211                 | 303            | 191            | 18             | 3              | 1 360                  | 1 680                    | 0,25                | 2,71           | 4,04           | 2,65           | 148                | 2 400             | 1 670             |
| 30 | -              | 210                 | 303            | 195            | 21             | 3              | 1 710                  | 2 340                    | 0,33                | 2,07           | 3,09           | 2,03           | 173                | 2 000             | 1 090             |
| 30 | -              | 217                 | 363            | 195            | 8              | 3              | 1 760                  | 2 360                    | 0,37                | 1,83           | 2,72           | 1,79           | 209                | 1 500             | 1 270             |
| 31 | -              | 216                 | 306            | 202            | 9              | 2,5            | 1 610                  | 2 220                    | 0,3                 | 2,28           | 3,39           | 2,23           | 218                | 2 000             | 1 260             |
| 31 | -              | 213                 | 306            | 197            | 17             | 2,5            | 1 670                  | 2 500                    | 0,37                | 1,82           | 2,7            | 1,78           | 226                | 1 400             | 880               |
| 31 | -              | 223                 | 323            | 202            | 21             | 3              | 1 200                  | 1 830                    | 0,28                | 2,39           | 3,56           | 2,34           | 122                | 1 800             | 1 600             |
| 31 | -              | 222                 | 323            | 206            | 21             | 3              | 1 560                  | 2 600                    | 0,36                | 1,86           | 2,77           | 1,82           | 156                | 1 700             | 1 020             |
| 31 | -              | 228                 | 380            | 206            | 9              | 4              | 1 860                  | 2 500                    | 0,37                | 1,83           | 2,72           | 1,79           | 213                | 1 500             | 1 220             |
| 32 | -              | 231                 | 326            | 212            | 10             | 2,5            | 1 320                  | 2 280                    | 0,35                | 1,95           | 2,9            | 1,91           | 131                | 1 700             | 1 230             |
| 32 | -              | 225                 | 326            | 207            | 17             | 2,5            | 1 700                  | 3 000                    | 0,42                | 1,62           | 2,42           | 1,59           | 190                | 1 400             | 810               |
| 32 | -              | 234                 | 343            | 212            | 24             | 3              | 1 320                  | 2 000                    | 0,29                | 2,35           | 3,5            | 2,3            | 123                | 1 700             | 1 530             |
| 32 | -              | 237                 | 343            | 216            | 20             | 3              | 1 660                  | 2 750                    | 0,37                | 1,83           | 2,72           | 1,79           | 163                | 1 500             | 980               |
| 32 | -              | 240                 | 400            | 216            | 10             | 4              | 2 080                  | 2 800                    | 0,36                | 1,87           | 2,79           | 1,83           | 189                | 1 400             | 1 120             |
| -  | 40             | 247                 | 327,6          | 231            | 12             | 2,5            | 1 100                  | 2 000                    | 0,26                | 2,55           | 3,8            | 2,5            | 132                | 1 700             | 1 440             |
| -  | 40             | 245                 | 327,6          | 228            | 17             | 2,5            | 1 400                  | 2 700                    | 0,34                | 1,96           | 2,92           | 1,92           | 139                | 1 300             | 1 070             |
| 35 | -              | 253                 | 353            | 233            | 10             | 3              | 1 630                  | 2 900                    | 0,33                | 2,03           | 3,02           | 1,98           | 165                | 1 400             | 1 060             |
| 35 | -              | 247                 | 353            | 228            | 18             | 3              | 1 900                  | 3 450                    | 0,41                | 1,63           | 2,43           | 1,6            | 197                | 1 300             | 720               |
| 35 | -              | 258                 | 383            | 233            | 22             | 3              | 1 630                  | 2 450                    | 0,29                | 2,35           | 3,5            | 2,3            | 153                | 1 400             | 1 300             |
| 35 | -              | 259                 | 383            | 236            | 11             | 3              | 2 040                  | 3 450                    | 0,37                | 1,83           | 2,72           | 1,79           | 181                | 1 400             | 850               |
| 35 | -              | 272                 | 440            | 236            | 10             | 4              | 2 320                  | 3 350                    | 0,35                | 1,95           | 2,9            | 1,91           | 217                | 1 300             | 970               |
| -  | 45             | 261                 | 309,8          | 250            | 11             | 2,1            | 640                    | 1 370                    | 0,17                | 4,05           | 6,04           | 3,96           | 93                 | 1 500             | 1 310             |
| -  | 45             | 268                 | 347,6          | 251            | 11             | 2,5            | 1 160                  | 2 200                    | 0,25                | 2,74           | 4,08           | 2,68           | 130                | 1 400             | 1 310             |
| -  | 45             | 263                 | 347,6          | 253            | 12             | 2,5            | 1 500                  | 2 900                    | 0,32                | 2,1            | 3,13           | 2,06           | 150                | 1 300             | 970               |
| 37 | -              | 276                 | 383            | 254            | 11             | 3              | 1 860                  | 3 250                    | 0,33                | 2,06           | 3,06           | 2,01           | 177                | 1 300             | 970               |
| 37 | -              | 270                 | 383            | 248            | 19             | 3              | 2 120                  | 3 900                    | 0,41                | 1,66           | 2,47           | 1,62           | 231                | 1 200             | 660               |
| 37 | -              | 283                 | 423            | 254            | 19             | 3              | 1 960                  | 3 050                    | 0,29                | 2,35           | 3,5            | 2,3            | 184                | 1 300             | 1 180             |
| 37 | -              | 284                 | 423            | 257            | 6              | 3              | 2 450                  | 4 250                    | 0,37                | 1,8            | 2,69           | 1,76           | 231                | 1 300             | 750               |
| 37 | -              | 296                 | 480            | 257            | 11             | 4              | 2 650                  | 3 900                    | 0,35                | 1,95           | 2,9            | 1,91           | 249                | 1 500             | 870               |
| -  | 45             | 285                 | 349,8          | 270            | 11             | 2,1            | 930                    | 1 930                    | 0,19                | 3,54           | 5,27           | 3,46           | 108                | 1 400             | 1 190             |
| -  | 45             | 291                 | 385,4          | 272            | 13             | 3              | 1 500                  | 2 800                    | 0,26                | 2,64           | 3,93           | 2,58           | 155                | 1 300             | 1 160             |
| -  | 45             | 287                 | 385,4          | 269            | 20             | 3              | 1 900                  | 3 800                    | 0,35                | 1,94           | 2,88           | 1,89           | 204                | 1 100             | 870               |

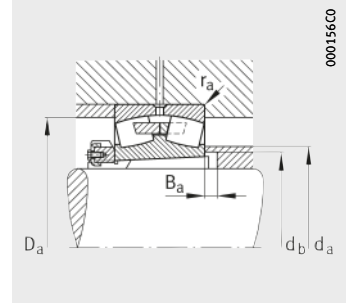


# Spherical roller bearings

With adapter sleeve



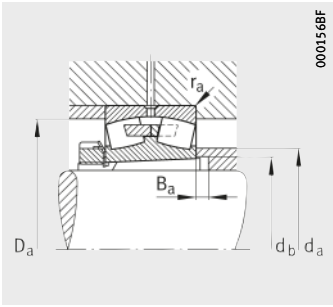
With central rib  
Locknut with tab washer



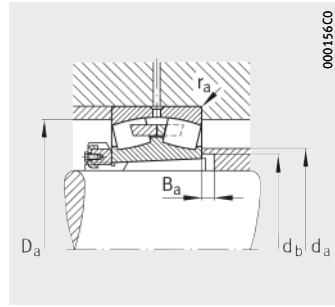
With central rib  
Locknut with retaining bracket

**Dimension table (continued)** · Dimensions in mm

| Designation           |                | Mass<br>m |                | Dimensions      |     |     |     |      |                |                |                |                |     |    |                |
|-----------------------|----------------|-----------|----------------|-----------------|-----|-----|-----|------|----------------|----------------|----------------|----------------|-----|----|----------------|
| Bearing               | Adapter sleeve | Bearing   | Adapter sleeve | d <sub>1H</sub> | d   | D   | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | D <sub>m</sub> | l   | c  | c <sub>1</sub> |
|                       |                | ≈ kg      | ≈ kg           |                 |     |     |     | min. | ≈              |                |                |                |     | ≈  | ≈              |
| <b>23152-K-MB</b>     | <b>H3152X</b>  | 89,6      | 23,5           | <b>240</b>      | 260 | 440 | 144 | 4    | 379,7          | 9,5            | 17,7           | 330            | 190 | 38 | –              |
| <b>24152-B-K30</b>    | <b>H24152</b>  | 112       | 25,2           | <b>240</b>      | 260 | 440 | 180 | 4    | 370,3          | 8              | 15             | 330            | 235 | 38 | –              |
| <b>22252-B-K-MB</b>   | <b>H3152X</b>  | 106       | 23,5           | <b>240</b>      | 260 | 480 | 130 | 5    | 415,3          | 12,5           | 23,5           | 330            | 190 | 38 | –              |
| <b>23252-B-K-MB</b>   | <b>H2352X</b>  | 136       | 25,7           | <b>240</b>      | 260 | 480 | 174 | 5    | 405,4          | 12,5           | 23,5           | 330            | 211 | 38 | –              |
| <b>22352-K-MB</b>     | <b>H2352X</b>  | 177       | 25,7           | <b>240</b>      | 260 | 540 | 165 | 6    | 452,1          | 12,5           | 23,5           | 330            | 211 | 38 | –              |
| <b>23956-K-MB</b>     | <b>H3956</b>   | 24,7      | 15,6           | <b>260</b>      | 280 | 380 | 75  | 2,1  | 350            | 8              | 15             | 330            | 121 | –  | 49             |
| <b>23056-B-K-MB</b>   | <b>H3056</b>   | 50,3      | 18,5           | <b>260</b>      | 280 | 420 | 106 | 4    | 376,5          | 9,5            | 17,7           | 330            | 152 | –  | 49             |
| <b>24056-B-K30-MB</b> | <b>H24056</b>  | 69,7      | 20,9           | <b>260</b>      | 280 | 420 | 140 | 4    | 369,5          | 6,3            | 12,2           | 330            | 195 | –  | 49             |
| <b>23156-B-K-MB</b>   | <b>H3156X</b>  | 96,4      | 26,4           | <b>260</b>      | 280 | 460 | 146 | 5    | 401,4          | 9,5            | 17,7           | 350            | 195 | 39 | –              |
| <b>24156-B-K30</b>    | <b>H24156</b>  | 118       | 28             | <b>260</b>      | 280 | 460 | 180 | 5    | 392,8          | 8              | 15             | 350            | 238 | 39 | –              |
| <b>22256-B-K-MB</b>   | <b>H3156X</b>  | 110       | 26,4           | <b>260</b>      | 280 | 500 | 130 | 5    | 435,2          | 12,5           | 23,5           | 350            | 195 | 39 | –              |
| <b>23256-K-MB</b>     | <b>H2356X</b>  | 153       | 29,8           | <b>260</b>      | 280 | 500 | 176 | 5    | 426,3          | 12,5           | 23,5           | 350            | 224 | 39 | –              |
| <b>22356-K-MB</b>     | <b>H2356X</b>  | 224       | 29,8           | <b>260</b>      | 280 | 580 | 175 | 6    | 489,3          | 12,5           | 23,5           | 350            | 224 | 39 | –              |
| <b>23960-B-K-MB</b>   | <b>H3960</b>   | 39,1      | 20,9           | <b>280</b>      | 300 | 420 | 90  | 3    | 384,6          | 9,5            | 17,7           | 360            | 140 | –  | 53             |
| <b>23060-K-MB</b>     | <b>H3060</b>   | 72,2      | 23,8           | <b>280</b>      | 300 | 460 | 118 | 4    | 412,6          | 9,5            | 17,7           | 360            | 168 | –  | 53             |
| <b>24060-B-K30-MB</b> | <b>H24060</b>  | 97,7      | 26,9           | <b>280</b>      | 300 | 460 | 160 | 4    | 401,5          | 8              | 15             | 360            | 220 | –  | 53             |
| <b>23160-B-K-MB</b>   | <b>H3160</b>   | 123       | 30,6           | <b>280</b>      | 300 | 500 | 160 | 5    | 434,7          | 9,5            | 17,7           | 380            | 208 | –  | 53             |
| <b>24160-B-K30</b>    | <b>H24160</b>  | 158       | 32,7           | <b>280</b>      | 300 | 500 | 200 | 5    | 424,4          | 8              | 15             | 380            | 258 | –  | 53             |
| <b>22260-K-MB</b>     | <b>H3160</b>   | 136       | 30,6           | <b>280</b>      | 300 | 540 | 140 | 5    | 468,8          | 12,5           | 23,5           | 380            | 208 | –  | 53             |
| <b>23260-K-MB</b>     | <b>H3260</b>   | 192       | 34,7           | <b>280</b>      | 300 | 540 | 192 | 5    | 458,7          | 12,5           | 23,5           | 380            | 240 | –  | 53             |
| <b>22360-K-MB</b>     | <b>H3260</b>   | 365       | 34,7           | <b>280</b>      | 300 | 620 | 185 | 7,5  | 523,6          | 12,5           | 23,5           | 380            | 240 | –  | 53             |
| <b>23964-K-MB</b>     | <b>H3964</b>   | 41        | 22             | <b>300</b>      | 320 | 440 | 90  | 3    | 406,2          | 9,5            | 17,7           | 380            | 140 | –  | 56             |
| <b>23064-K-MB</b>     | <b>H3064</b>   | 77,1      | 25,4           | <b>300</b>      | 320 | 480 | 121 | 4    | 432,6          | 9,5            | 17,7           | 380            | 171 | –  | 56             |
| <b>24064-B-K30-MB</b> | <b>H24064</b>  | 103       | 28,4           | <b>300</b>      | 320 | 480 | 160 | 4    | 424            | 8              | 15             | 380            | 220 | –  | 56             |
| <b>23164-K-MB</b>     | <b>H3164</b>   | 167       | 35,4           | <b>300</b>      | 320 | 540 | 176 | 5    | 466,2          | 12,5           | 23,5           | 400            | 226 | –  | 56             |
| <b>24164-B-K30</b>    | <b>H24164</b>  | 197       | 37,4           | <b>300</b>      | 320 | 540 | 218 | 5    | 456,1          | 9,5            | 17,7           | 400            | 278 | –  | 56             |
| <b>22264-K-MB</b>     | <b>H3164</b>   | 166       | 35,4           | <b>300</b>      | 320 | 580 | 150 | 5    | 503,5          | 12,5           | 23,5           | 400            | 226 | –  | 56             |
| <b>23264-K-MB</b>     | <b>H3264</b>   | 229       | 40             | <b>300</b>      | 320 | 580 | 208 | 5    | 489,6          | 12,5           | 23,5           | 400            | 258 | –  | 56             |
| <b>22364-B-K-MB</b>   | <b>H3264</b>   | 433       | 40             | <b>300</b>      | 320 | 670 | 200 | 7,5  | 568,1          | 12,5           | 23,5           | 400            | 258 | –  | 56             |
| <b>23068-K-MB</b>     | <b>H3068</b>   | 101       | 30             | <b>320</b>      | 340 | 520 | 133 | 5    | 464,6          | 12,5           | 23,5           | 400            | 187 | –  | 57             |
| <b>24068-B-K30-MB</b> | <b>H24068</b>  | 143       | 33,8           | <b>320</b>      | 340 | 520 | 180 | 5    | 457,1          | 9,5            | 17,7           | 400            | 244 | –  | 57             |
| <b>23168-B-K-MB</b>   | <b>H3168</b>   | 203       | 50,1           | <b>320</b>      | 340 | 580 | 190 | 5    | 499,5          | 12,5           | 23,5           | 440            | 254 | –  | 70             |
| <b>24168-B-K30</b>    | <b>H24168</b>  | 260       | 53             | <b>320</b>      | 340 | 580 | 243 | 5    | 481,1          | 9,5            | 17,7           | 440            | 317 | –  | 70             |
| <b>22268-B-K-MB</b>   | <b>H3168</b>   | 311       | 50,1           | <b>320</b>      | 340 | 620 | 165 | 6    | 538,7          | 12,5           | 23,5           | 440            | 254 | –  | 70             |
| <b>23268-B-K-MB</b>   | <b>H3268</b>   | 291       | 55,4           | <b>320</b>      | 340 | 620 | 224 | 6    | 521,2          | 12,5           | 23,5           | 440            | 288 | –  | 70             |

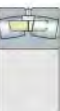


Mounting dimensions  
With central rib



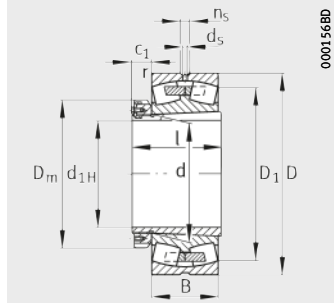
Mounting dimensions  
With retaining bracket

| Mounting dimensions |                |                |                |                | Basic load ratings  |                       | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|----------------|----------------|----------------|----------------|---------------------|-----------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | d <sub>b</sub> | B <sub>a</sub> | r <sub>a</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| max.                | max.           | min.           | min.           | max.           | kN                  | kN                    |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 302                 | 423            | 276            | 11             | 3              | 2 200               | 4 000                 | 0,33                | 2,03           | 3,02           | 1,98           | 213                | 1 200             | 850               |
| 294                 | 423            | 269            | 19             | 3              | 2 700               | 5 100                 | 0,42                | 1,61           | 2,4            | 1,58           | 315                | 1 100             | 550               |
| 308                 | 460            | 276            | 25             | 4              | 2 240               | 3 450                 | 0,29                | 2,32           | 3,45           | 2,26           | 217                | 1 100             | 1 070             |
| 309                 | 460            | 278            | 2              | 4              | 2 900               | 4 900                 | 0,37                | 1,8            | 2,69           | 1,76           | 270                | 1 100             | 660               |
| 322                 | 514            | 278            | 11             | 5              | 3 000               | 4 400                 | 0,34                | 2              | 2,98           | 1,96           | 290                | 1 100             | 790               |
| 303                 | 369,8          | 290            | 12             | 2,1            | 970                 | 2 040                 | 0,18                | 3,76           | 5,59           | 3,67           | 129                | 1 300             | 1 100             |
| 310                 | 405,4          | 292            | 12             | 3              | 1 560               | 3 000                 | 0,25                | 2,74           | 4,08           | 2,68           | 156                | 1 300             | 1 090             |
| 307                 | 405,4          | 289            | 20             | 3              | 2 000               | 4 000                 | 0,33                | 2,04           | 3,04           | 2              | 225                | 1 100             | 810               |
| 321                 | 440            | 296            | 12             | 4              | 2 360               | 4 400                 | 0,32                | 2,12           | 3,15           | 2,07           | 241                | 1 100             | 780               |
| 316                 | 440            | 289            | 21             | 4              | 2 700               | 5 200                 | 0,39                | 1,71           | 2,54           | 1,67           | 365                | 1 000             | 520               |
| 324                 | 480            | 296            | 28             | 4              | 2 360               | 3 650                 | 0,28                | 2,43           | 3,61           | 2,37           | 238                | 1 100             | 1 010             |
| 329                 | 480            | 299            | 11             | 4              | 3 000               | 5 300                 | 0,36                | 1,86           | 2,77           | 1,82           | 260                | 1 100             | 620               |
| 349                 | 554            | 299            | 12             | 5              | 3 550               | 5 400                 | 0,33                | 2,03           | 3,02           | 1,98           | 335                | 950               | 680               |
| 329                 | 407,6          | 311            | 12             | 2,5            | 1 270               | 2 650                 | 0,2                 | 3,42           | 5,09           | 3,34           | 165                | 1 190             | 1 000             |
| 337                 | 445,4          | 313            | 12             | 3              | 1 960               | 3 650                 | 0,25                | 2,69           | 4              | 2,63           | 223                | 1 100             | 960               |
| 331                 | 445,4          | 310            | 21             | 3              | 2 500               | 5 200                 | 0,35                | 1,95           | 2,9            | 1,91           | 300                | 1 000             | 700               |
| 347                 | 480            | 318            | 12             | 4              | 2 650               | 4 900                 | 0,33                | 2,06           | 3,06           | 2,01           | 270                | 1 100             | 720               |
| 340                 | 480            | 311            | 21             | 4              | 3 250               | 6 300                 | 0,4                 | 1,67           | 2,49           | 1,63           | 540                | 900               | 455               |
| 352                 | 520            | 318            | 32             | 4              | 2 750               | 4 400                 | 0,27                | 2,47           | 3,67           | 2,41           | 300                | 1 000             | 900               |
| 353                 | 520            | 321            | 12             | 4              | 3 450               | 6 200                 | 0,37                | 1,83           | 2,72           | 1,79           | 300                | 1 000             | 560               |
| 374                 | 588            | 321            | 19             | 6              | 4 000               | 6 100                 | 0,33                | 2,06           | 3,06           | 2,01           | 375                | 900               | 630               |
| 349                 | 427,6          | 332            | 12             | 2,5            | 1 310               | 2 750                 | 0,19                | 3,62           | 5,39           | 3,54           | 202                | 1 100             | 930               |
| 357                 | 465,4          | 334            | 13             | 3              | 2 040               | 4 000                 | 0,25                | 2,74           | 4,08           | 2,68           | 243                | 1 100             | 900               |
| 353                 | 465,4          | 330            | 21             | 3              | 2 600               | 5 400                 | 0,33                | 2,06           | 3,06           | 2,01           | 360                | 950               | 660               |
| 369                 | 520            | 338            | 13             | 4              | 3 200               | 6 000                 | 0,34                | 1,98           | 2,94           | 1,93           | 305                | 950               | 650               |
| 362                 | 520            | 332            | 21             | 4              | 3 800               | 7 350                 | 0,41                | 1,65           | 2,46           | 1,61           | 530                | 850               | 415               |
| 378                 | 560            | 338            | 39             | 4              | 3 050               | 4 900                 | 0,27                | 2,47           | 3,67           | 2,41           | 345                | 950               | 830               |
| 378                 | 560            | 343            | 13             | 4              | 3 900               | 6 950                 | 0,37                | 1,8            | 2,69           | 1,76           | 330                | 950               | 510               |
| 406                 | 638            | 343            | 20             | 6              | 4 400               | 6 800                 | 0,33                | 2,06           | 3,06           | 2,01           | 540                | 800               | 560               |
| 382                 | 502            | 355            | 14             | 4              | 2 360               | 4 550                 | 0,25                | 2,69           | 4              | 2,63           | 285                | 1 000             | 840               |
| 378                 | 502            | 351            | 15             | 4              | 3 100               | 6 550                 | 0,34                | 1,98           | 2,94           | 1,93           | 530                | 850               | 600               |
| 395                 | 560            | 360            | 14             | 4              | 3 650               | 6 950                 | 0,34                | 1,98           | 2,94           | 1,93           | 570                | 900               | 590               |
| 383                 | 560            | 353            | 23             | 4              | 4 400               | 8 500                 | 0,43                | 1,56           | 2,32           | 1,53           | 680                | 800               | 380               |
| 405                 | 594            | 360            | 39             | 5              | 3 550               | 5 850                 | 0,28                | 2,43           | 3,61           | 2,37           | 470                | 850               | 750               |
| 402                 | 594            | 364            | 14             | 5              | 4 500               | 8 150                 | 0,38                | 1,78           | 2,65           | 1,74           | 650                | 850               | 465               |

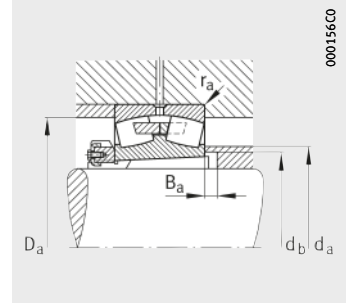


# Spherical roller bearings

With adapter sleeve



With central rib  
Locknut with retaining bracket

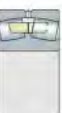


Mounting dimensions

Dimension table (continued) · Dimensions in mm

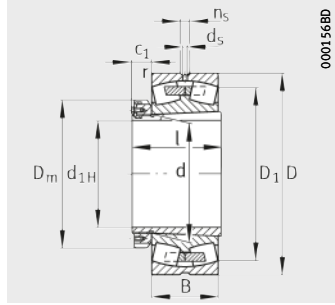
| Designation           |                | Mass<br>m |                | Dimensions      |     |     |     |      |                |                |                |                |     |                |
|-----------------------|----------------|-----------|----------------|-----------------|-----|-----|-----|------|----------------|----------------|----------------|----------------|-----|----------------|
| Bearing               | Adapter sleeve | Bearing   | Adapter sleeve | d <sub>1H</sub> | d   | D   | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | D <sub>m</sub> | l   | c <sub>1</sub> |
|                       |                | ≈ kg      | ≈ kg           |                 |     |     |     | min. | ≈              |                |                |                |     | ≈              |
| <b>23972-K-MB</b>     | <b>H3972</b>   | 45        | 25,9           | <b>340</b>      | 360 | 480 | 90  | 3    | 447,1          | 9,5            | 17,7           | 420            | 144 | 57             |
| <b>23072-K-MB</b>     | <b>H3072</b>   | 107       | 31,6           | <b>340</b>      | 360 | 540 | 134 | 5    | 485,2          | 12,5           | 23,5           | 420            | 188 | 57             |
| <b>24072-B-K30-MB</b> | <b>H24072</b>  | 147       | 35,5           | <b>340</b>      | 360 | 540 | 180 | 5    | 478,5          | 9,5            | 17,7           | 420            | 244 | 57             |
| <b>23172-K-MB</b>     | <b>H3172</b>   | 217       | 54,3           | <b>340</b>      | 360 | 600 | 192 | 5    | 520            | 12,5           | 23,5           | 460            | 259 | 73             |
| <b>24172-B-K30</b>    | <b>H24172</b>  | 275       | 57,1           | <b>340</b>      | 360 | 600 | 243 | 5    | 503,6          | 9,5            | 17,7           | 460            | 321 | 73             |
| <b>22272-K-MB</b>     | <b>H3172</b>   | 257       | 54,3           | <b>340</b>      | 360 | 650 | 170 | 6    | 565            | 12,5           | 23,5           | 460            | 259 | 73             |
| <b>23272-B-K-MB</b>   | <b>H3272</b>   | 328       | 61             | <b>340</b>      | 360 | 650 | 232 | 6    | 548,3          | 12,5           | 23,5           | 460            | 299 | 73             |
| <b>22372-K-MB</b>     | <b>H3272</b>   | 625       | 61             | <b>340</b>      | 360 | 750 | 224 | 7,5  | 634,9          | 12,5           | 23,5           | 460            | 299 | 73             |
| <b>23976-K-MB</b>     | <b>H3976</b>   | 66,3      | 32,1           | <b>360</b>      | 380 | 520 | 106 | 4    | 477,6          | 9,5            | 17,7           | 450            | 164 | 62             |
| <b>23076-B-K-MB</b>   | <b>H3076</b>   | 115       | 36,2           | <b>360</b>      | 380 | 560 | 135 | 5    | 505,6          | 12,5           | 23,5           | 450            | 193 | 62             |
| <b>24076-B-K30-MB</b> | <b>H24076</b>  | 155       | 40,1           | <b>360</b>      | 380 | 560 | 180 | 5    | 499            | 9,5            | 17,7           | 450            | 248 | 62             |
| <b>23176-K-MB</b>     | <b>H3176</b>   | 226       | 62,4           | <b>360</b>      | 380 | 620 | 194 | 5    | 539,6          | 12,5           | 23,5           | 490            | 264 | 75             |
| <b>24176-B-K30</b>    | <b>H24176</b>  | 277       | 64,9           | <b>360</b>      | 380 | 620 | 243 | 5    | 525,8          | 9,5            | 17,7           | 490            | 323 | 75             |
| <b>22276-K-MB</b>     | <b>H3176</b>   | 284       | 62,4           | <b>360</b>      | 380 | 680 | 175 | 6    | 592,6          | 12,5           | 23,5           | 490            | 264 | 75             |
| <b>23276-B-K-MB</b>   | <b>H3276</b>   | 367       | 70,7           | <b>360</b>      | 380 | 680 | 240 | 6    | 576,4          | 12,5           | 23,5           | 490            | 310 | 75             |
| <b>23980-B-K-MB</b>   | <b>H3980</b>   | 68,2      | 35,4           | <b>380</b>      | 400 | 540 | 106 | 4    | 499            | 9,5            | 17,7           | 470            | 168 | 66             |
| <b>23080-K-MB</b>     | <b>H3080</b>   | 143       | 41,7           | <b>380</b>      | 400 | 600 | 148 | 5    | 540,5          | 12,5           | 23,5           | 470            | 210 | 66             |
| <b>24080-B-K30-MB</b> | <b>H24080</b>  | 196       | 46,4           | <b>380</b>      | 400 | 600 | 200 | 5    | 530,9          | 12,5           | 23,5           | 470            | 272 | 66             |
| <b>23180-B-K-MB</b>   | <b>H3180</b>   | 261       | 71,3           | <b>380</b>      | 400 | 650 | 200 | 6    | 567,2          | 12,5           | 23,5           | 520            | 272 | 81             |
| <b>24180-B-K30</b>    | <b>H24180</b>  | 312       | 73,8           | <b>380</b>      | 400 | 650 | 250 | 6    | 553,5          | 12,5           | 23,5           | 520            | 332 | 81             |
| <b>22280-K-MB</b>     | <b>H3180</b>   | 414       | 71,3           | <b>380</b>      | 400 | 720 | 185 | 6    | 629,3          | 12,5           | 23,5           | 520            | 272 | 81             |
| <b>23280-B-K-MB</b>   | <b>H3280</b>   | 442       | 82,1           | <b>380</b>      | 400 | 720 | 256 | 6    | 609,8          | 12,5           | 23,5           | 520            | 328 | 81             |
| <b>22380-K-MB</b>     | <b>H3280</b>   | 800       | 82,1           | <b>380</b>      | 400 | 820 | 243 | 7,5  | 694,4          | 12,5           | 23,5           | 520            | 328 | 81             |
| <b>23984-K-MB</b>     | <b>H3984</b>   | 78        | 36,9           | <b>400</b>      | 420 | 560 | 106 | 4    | 519,5          | 9,5            | 17,7           | 490            | 168 | 66             |
| <b>23084-B-K-MB</b>   | <b>H3084X</b>  | 155       | 43,8           | <b>400</b>      | 420 | 620 | 150 | 5    | 560,7          | 12,5           | 23,5           | 490            | 212 | 66             |
| <b>24084-B-K30-MB</b> | <b>H24084</b>  | 214       | 48,6           | <b>400</b>      | 420 | 620 | 200 | 5    | 550,2          | 12,5           | 23,5           | 490            | 274 | 66             |
| <b>23184-K-MB</b>     | <b>H3184</b>   | 339       | 85,1           | <b>400</b>      | 420 | 700 | 224 | 6    | 605,4          | 12,5           | 23,5           | 540            | 304 | 89             |
| <b>24184-B-K30</b>    | <b>H24184</b>  | 407       | 87,8           | <b>400</b>      | 420 | 700 | 280 | 6    | 590,3          | 12,5           | 23,5           | 540            | 372 | 89             |
| <b>22284-K-MB</b>     | <b>H3184</b>   | 404       | 85,1           | <b>400</b>      | 420 | 760 | 195 | 7,5  | 661,8          | 12,5           | 23,5           | 540            | 304 | 89             |
| <b>23284-B-K-MB</b>   | <b>H3284</b>   | 539       | 95,3           | <b>400</b>      | 420 | 760 | 272 | 7,5  | 642,2          | 12,5           | 23,5           | 540            | 352 | 89             |
| <b>23988-K-MB</b>     | <b>H3988</b>   | 98,3      | 59             | <b>410</b>      | 440 | 600 | 118 | 4    | 552,8          | 12,5           | 23,5           | 520            | 189 | 75             |
| <b>23088-K-MB</b>     | <b>H3088</b>   | 177       | 67,7           | <b>410</b>      | 440 | 650 | 157 | 6    | 586,8          | 12,5           | 23,5           | 520            | 228 | 75             |
| <b>24088-B-K30-MB</b> | <b>H24088</b>  | 247       | 76,4           | <b>410</b>      | 440 | 650 | 212 | 6    | 575,6          | 12,5           | 23,5           | 520            | 294 | 75             |

| Mounting dimensions |                |                |                |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|----------------|----------------|----------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | d <sub>b</sub> | B <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| max.                | max.           | min.           | min.           | max.           | kN                     | kN                       |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 389                 | 467,6          | 372            | 14             | 2,5            | 1 430                  | 3 200                    | 0,17                | 4,05           | 6,04           | 3,96           | 209                | 1 000             | 800               |
| 402                 | 522            | 375            | 14             | 4              | 2 450                  | 4 800                    | 0,25                | 2,74           | 4,08           | 2,68           | 295                | 950               | 790               |
| 397                 | 522            | 371            | 23             | 4              | 3 250                  | 6 800                    | 0,33                | 2,06           | 3,06           | 2,01           | 530                | 800               | 560               |
| 416                 | 580            | 380            | 14             | 4              | 3 800                  | 7 350                    | 0,33                | 2,06           | 3,06           | 2,01           | 360                | 850               | 550               |
| 405                 | 580            | 373            | 24             | 4              | 4 500                  | 9 000                    | 0,41                | 1,63           | 2,43           | 1,6            | 550                | 750               | 355               |
| 429                 | 624            | 380            | 35             | 5              | 3 900                  | 6 550                    | 0,28                | 2,43           | 3,61           | 2,37           | 420                | 800               | 700               |
| 424                 | 624            | 385            | 14             | 5              | 4 900                  | 9 150                    | 0,38                | 1,78           | 2,65           | 1,74           | 720                | 800               | 425               |
| 453                 | 718            | 385            | 21             | 6              | 5 600                  | 8 800                    | 0,33                | 2,06           | 3,06           | 2,01           | 650                | 700               | 480               |
| 415                 | 505,4          | 393            | 15             | 3              | 1 760                  | 4 000                    | 0,19                | 3,58           | 5,33           | 3,5            | 265                | 950               | 750               |
| 422                 | 542            | 396            | 15             | 4              | 2 550                  | 5 300                    | 0,24                | 2,84           | 4,23           | 2,78           | 430                | 900               | 730               |
| 417                 | 542            | 391            | 25             | 4              | 3 350                  | 7 200                    | 0,31                | 2,15           | 3,2            | 2,1            | 580                | 750               | 520               |
| 436                 | 600            | 401            | 15             | 4              | 4 050                  | 8 150                    | 0,32                | 2,12           | 3,15           | 2,07           | 385                | 800               | 510               |
| 427                 | 600            | 393            | 25             | 4              | 4 650                  | 9 500                    | 0,39                | 1,71           | 2,54           | 1,67           | 770                | 700               | 330               |
| 451                 | 654            | 401            | 33             | 5              | 4 150                  | 7 100                    | 0,27                | 2,51           | 3,74           | 2,45           | 550                | 750               | 630               |
| 447                 | 654            | 405            | 15             | 5              | 5 300                  | 9 800                    | 0,37                | 1,8            | 2,69           | 1,76           | 780                | 750               | 395               |
| 435                 | 525,4          | 413            | 15             | 3              | 1 830                  | 4 150                    | 0,18                | 3,71           | 5,52           | 3,63           | 275                | 900               | 710               |
| 448                 | 582            | 417            | 15             | 4              | 3 050                  | 6 200                    | 0,24                | 2,79           | 4,15           | 2,73           | 365                | 800               | 670               |
| 442                 | 582            | 412            | 25             | 4              | 3 900                  | 8 500                    | 0,33                | 2,06           | 3,06           | 2,01           | 670                | 700               | 485               |
| 457                 | 624            | 421            | 15             | 5              | 4 250                  | 8 500                    | 0,31                | 2,15           | 3,2            | 2,1            | 670                | 750               | 485               |
| 448                 | 624            | 413            | 25             | 5              | 5 100                  | 10 400                   | 0,39                | 1,72           | 2,56           | 1,68           | 720                | 670               | 310               |
| 476                 | 694            | 421            | 30             | 5              | 4 650                  | 7 800                    | 0,26                | 2,55           | 3,8            | 2,5            | 600                | 700               | 600               |
| 473                 | 694            | 427            | 15             | 5              | 5 700                  | 10 800                   | 0,38                | 1,78           | 2,65           | 1,74           | 820                | 700               | 370               |
| 497                 | 788            | 427            | 27             | 6              | 6 550                  | 10 600                   | 0,33                | 2,07           | 3,09           | 2,03           | 610                | 670               | 400               |
| 455                 | 545,4          | 433            | 15             | 3              | 1 900                  | 4 500                    | 0,18                | 3,85           | 5,73           | 3,76           | 300                | 850               | 660               |
| 468                 | 602            | 437            | 16             | 4              | 3 150                  | 6 550                    | 0,24                | 2,84           | 4,23           | 2,78           | 395                | 800               | 640               |
| 460                 | 602            | 438            | 18             | 4              | 4 000                  | 8 800                    | 0,32                | 2,13           | 3,17           | 2,08           | 710                | 670               | 460               |
| 483                 | 674            | 443            | 16             | 5              | 5 000                  | 9 650                    | 0,33                | 2,03           | 3,02           | 1,98           | 465                | 700               | 455               |
| 476                 | 674            | 434            | 27             | 5              | 6 200                  | 12 700                   | 0,4                 | 1,67           | 2,49           | 1,63           | 980                | 630               | 265               |
| 499                 | 728            | 443            | 45             | 6              | 5 100                  | 8 650                    | 0,27                | 2,51           | 3,74           | 2,45           | 630                | 670               | 500               |
| 495                 | 728            | 449            | 16             | 6              | 6 550                  | 12 200                   | 0,38                | 1,77           | 2,64           | 1,73           | 930                | 670               | 340               |
| 482                 | 585,4          | 454            | 17             | 3              | 2 240                  | 5 200                    | 0,18                | 3,66           | 5,46           | 3,58           | 295                | 800               | 620               |
| 488                 | 627            | 458            | 17             | 5              | 3 400                  | 7 100                    | 0,24                | 2,84           | 4,23           | 2,78           | 405                | 750               | 610               |
| 483                 | 627            | 452            | 27             | 5              | 4 300                  | 9 650                    | 0,32                | 2,12           | 3,15           | 2,07           | 750                | 630               | 430               |

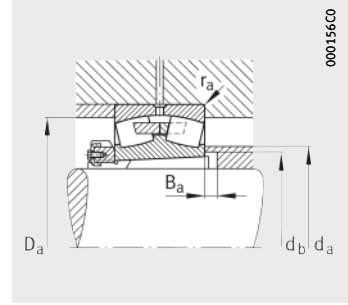


# Spherical roller bearings

With adapter sleeve



With central rib  
Locknut with retaining bracket

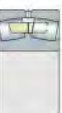


Mounting dimensions

Dimension table (continued) · Dimensions in mm

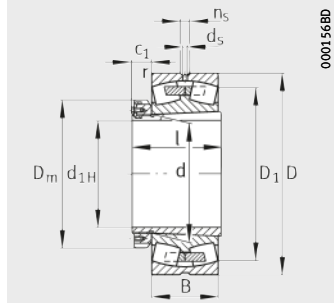
| Designation             |                 | Mass<br>m |                | Dimensions      |     |       |     |      |                |                |                |                |     |                |  |
|-------------------------|-----------------|-----------|----------------|-----------------|-----|-------|-----|------|----------------|----------------|----------------|----------------|-----|----------------|--|
| Bearing                 | Adapter sleeve  | Bearing   | Adapter sleeve | d <sub>1H</sub> | d   | D     | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | D <sub>m</sub> | l   | c <sub>1</sub> |  |
|                         |                 | ≈kg       | ≈kg            |                 |     |       |     | min. | ≈              |                |                |                |     | ≈              |  |
| <b>23188-K-MB</b>       | <b>H3188</b>    | 378       | 105            | <b>410</b>      | 440 | 720   | 226 | 6    | 626            | 12,5           | 23,5           | 560            | 307 | 89             |  |
| <b>24188-B-K30</b>      | <b>H24188</b>   | 451       | 111            | <b>410</b>      | 440 | 720   | 280 | 6    | 612,4          | 12,5           | 23,5           | 560            | 372 | 89             |  |
| <b>22288-K-MB</b>       | <b>H3188</b>    | 440       | 105            | <b>410</b>      | 440 | 790   | 200 | 7,5  | 689,5          | 12,5           | 23,5           | 560            | 307 | 89             |  |
| <b>23288-B-K-MB</b>     | <b>H3288</b>    | 586       | 120            | <b>410</b>      | 440 | 790   | 280 | 7,5  | 669,3          | 12,5           | 23,5           | 560            | 361 | 89             |  |
| <b>23992-B-K-MB</b>     | <b>H3992</b>    | 103       | 61,4           | <b>430</b>      | 460 | 620   | 118 | 4    | 573,3          | 12,5           | 23,5           | 540            | 189 | 75             |  |
| <b>23092-B-K-MB</b>     | <b>H3092</b>    | 212       | 71,8           | <b>430</b>      | 460 | 680   | 163 | 6    | 612,2          | 12,5           | 23,5           | 540            | 234 | 75             |  |
| <b>24092-B-K30-MB</b>   | <b>H24092</b>   | 359       | 80,8           | <b>430</b>      | 460 | 680   | 218 | 6    | 603,3          | 12,5           | 23,5           | 540            | 300 | 75             |  |
| <b>23192-K-MB</b>       | <b>H3192</b>    | 420       | 118            | <b>430</b>      | 460 | 760   | 240 | 7,5  | 661,4          | 12,5           | 23,5           | 580            | 326 | 94             |  |
| <b>24192-B-K30-MB</b>   | <b>H24192</b>   | 578       | 124            | <b>430</b>      | 460 | 760   | 300 | 7,5  | 642,8          | 12,5           | 23,5           | 580            | 398 | 94             |  |
| <b>23292-K-MB</b>       | <b>H3292</b>    | 699       | 134            | <b>430</b>      | 460 | 830   | 296 | 7,5  | 701,6          | 12,5           | 23,5           | 580            | 382 | 94             |  |
| <b>23996-B-K-MB</b>     | <b>H3996</b>    | 121       | 66,8           | <b>450</b>      | 480 | 650   | 128 | 5    | 598,8          | 12,5           | 23,5           | 560            | 200 | 75             |  |
| <b>23096-K-MB</b>       | <b>H3096</b>    | 208       | 75,9           | <b>450</b>      | 480 | 700   | 165 | 6    | 632,6          | 12,5           | 23,5           | 560            | 237 | 75             |  |
| <b>24096-B-K30-MB</b>   | <b>H24096</b>   | 289       | 84,7           | <b>450</b>      | 480 | 700   | 218 | 6    | 625,4          | 12,5           | 23,5           | 560            | 301 | 75             |  |
| <b>23196-K-MB</b>       | <b>H3196</b>    | 470       | 135            | <b>450</b>      | 480 | 790   | 248 | 7,5  | 688,3          | 12,5           | 23,5           | 620            | 335 | 94             |  |
| <b>24196-B-K30-MB</b>   | <b>H24196</b>   | 628       | 142            | <b>450</b>      | 480 | 790   | 308 | 7,5  | 669,9          | 12,5           | 23,5           | 620            | 408 | 94             |  |
| <b>23296-K-MB</b>       | <b>H3296</b>    | 806       | 155            | <b>450</b>      | 480 | 870   | 310 | 7,5  | 734,8          | 12,5           | 23,5           | 620            | 397 | 94             |  |
| <b>239/500-K-MB</b>     | <b>H39/500</b>  | 124       | 75,2           | <b>470</b>      | 500 | 670   | 128 | 5    | 619,3          | 12,5           | 23,5           | 580            | 208 | 83             |  |
| <b>230/500-B-K-MB</b>   | <b>H30/500</b>  | 219       | 85,2           | <b>470</b>      | 500 | 720   | 167 | 6    | 653,5          | 12,5           | 23,5           | 580            | 247 | 83             |  |
| <b>240/500-B-K30-MB</b> | <b>H240/500</b> | 384       | 93,8           | <b>470</b>      | 500 | 720   | 218 | 6    | 645,8          | 12,5           | 23,5           | 580            | 309 | 83             |  |
| <b>231/500-B-K-MB</b>   | <b>H31/500</b>  | 556       | 145            | <b>470</b>      | 500 | 830   | 264 | 7,5  | 720,9          | 12,5           | 23,5           | 630            | 356 | 99             |  |
| <b>241/500-B-K30-MB</b> | <b>H241/500</b> | 738       | 151            | <b>470</b>      | 500 | 830   | 325 | 7,5  | 701,8          | 12,5           | 23,5           | 630            | 430 | 99             |  |
| <b>232/500-K-MB</b>     | <b>H32/500</b>  | 984       | 170            | <b>470</b>      | 500 | 920   | 336 | 7,5  | 773,8          | 12,5           | 23,5           | 630            | 428 | 99             |  |
| <b>239/530-K-MB</b>     | <b>H39/530</b>  | 146       | 89             | <b>500</b>      | 530 | 710   | 136 | 5    | 656,5          | 12,5           | 23,5           | 630            | 216 | 89             |  |
| <b>230/530-K-MB</b>     | <b>H30/530</b>  | 291       | 103            | <b>500</b>      | 530 | 780   | 185 | 6    | 703,7          | 12,5           | 23,5           | 630            | 265 | 89             |  |
| <b>240/530-B-K30-MB</b> | <b>H240/530</b> | 418       | 115            | <b>500</b>      | 530 | 780   | 250 | 6    | 691,9          | 12,5           | 23,5           | 630            | 343 | 89             |  |
| <b>231/530-K-MB</b>     | <b>H31/530</b>  | 643       | 161            | <b>500</b>      | 530 | 870   | 272 | 7,5  | 756,3          | 12,5           | 23,5           | 670            | 364 | 102            |  |
| <b>241/530-B-K30-MB</b> | <b>H241/530</b> | 856       | 167            | <b>500</b>      | 530 | 870   | 335 | 7,5  | 739,1          | 12,5           | 23,5           | 670            | 440 | 102            |  |
| <b>232/530-K-MB</b>     | <b>H32/530</b>  | 1 200     | 192            | <b>500</b>      | 530 | 980   | 355 | 9,5  | 824,4          | 12,5           | 23,5           | 670            | 447 | 102            |  |
| <b>239/560-B-K-MB</b>   | <b>H39/560</b>  | 169       | 95,6           | <b>530</b>      | 560 | 750   | 140 | 5    | 693,4          | 12,5           | 23,5           | 650            | 227 | 96             |  |
| <b>230/560-B-K-MB</b>   | <b>H30/560</b>  | 339       | 112            | <b>530</b>      | 560 | 820   | 195 | 6    | 741,5          | 12,5           | 23,5           | 650            | 282 | 96             |  |
| <b>240/560-B-K30-MB</b> | <b>H240/560</b> | 458       | 124            | <b>530</b>      | 560 | 820   | 258 | 6    | 731,2          | 12,5           | 23,5           | 650            | 358 | 96             |  |
| <b>231/560-K-MB</b>     | <b>H31/560</b>  | 737       | 184            | <b>530</b>      | 560 | 920   | 280 | 7,5  | 800,2          | 12,5           | 23,5           | 710            | 377 | 107            |  |
| <b>241/560-B-K30-MB</b> | <b>H241/560</b> | 974       | 195            | <b>530</b>      | 560 | 920   | 355 | 7,5  | 785            | 12,5           | 23,5           | 710            | 468 | 107            |  |
| <b>232/560-K-MB</b>     | <b>H32/560</b>  | 1 360     | 218            | <b>530</b>      | 560 | 1 030 | 365 | 9,5  | 868,1          | 12,5           | 23,5           | 710            | 462 | 107            |  |

| Mounting dimensions |                |                |                |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|----------------|----------------|----------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | d <sub>b</sub> | B <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| max.                | max.           | min.           | min.           | max.           | kN                     | kN                       |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 504                 | 694            | 463            | 17             | 5              | 5 200                  | 10 400                   | 0,32                | 2,1            | 3,13           | 2,06           | 485                | 700               | 425               |
| 494                 | 694            | 454            | 27             | 5              | 6 400                  | 13 200                   | 0,38                | 1,76           | 2,62           | 1,72           | 1 020              | 600               | 255               |
| 520                 | 758            | 463            | 42             | 6              | 5 400                  | 9 300                    | 0,27                | 2,51           | 3,74           | 2,45           | 680                | 630               | 530               |
| 516                 | 758            | 469            | 17             | 6              | 7 100                  | 13 400                   | 0,37                | 1,8            | 2,69           | 1,76           | 990                | 630               | 320               |
| 500                 | 605,4          | 474            | 17             | 3              | 2 280                  | 5 400                    | 0,18                | 3,85           | 5,73           | 3,76           | 370                | 750               | 590               |
| 509                 | 657            | 478            | 17             | 5              | 3 650                  | 7 650                    | 0,24                | 2,84           | 4,23           | 2,78           | 440                | 700               | 580               |
| 505                 | 657            | 472            | 27             | 5              | 4 750                  | 10 600                   | 0,31                | 2,16           | 3,22           | 2,12           | 710                | 630               | 400               |
| 533                 | 728            | 484            | 17             | 6              | 5 850                  | 11 600                   | 0,32                | 2,12           | 3,15           | 2,07           | 530                | 630               | 390               |
| 517                 | 728            | 475            | 28             | 6              | 7 500                  | 15 600                   | 0,39                | 1,73           | 2,58           | 1,69           | 1 160              | 560               | 227               |
| 541                 | 798            | 490            | 17             | 6              | 7 800                  | 15 000                   | 0,37                | 1,8            | 2,69           | 1,76           | 620                | 600               | 295               |
| 523                 | 632            | 496            | 18             | 4              | 2 550                  | 6 000                    | 0,18                | 3,76           | 5,59           | 3,67           | 460                | 700               | 570               |
| 529                 | 677            | 499            | 18             | 5              | 3 800                  | 8 150                    | 0,23                | 2,9            | 4,31           | 2,83           | 455                | 670               | 550               |
| 525                 | 677            | 492            | 28             | 5              | 4 900                  | 11 200                   | 0,3                 | 2,25           | 3,34           | 2,2            | 830                | 600               | 380               |
| 554                 | 758            | 505            | 18             | 6              | 6 300                  | 12 700                   | 0,32                | 2,12           | 3,15           | 2,07           | 570                | 630               | 370               |
| 544                 | 758            | 495            | 29             | 6              | 8 000                  | 16 600                   | 0,39                | 1,75           | 2,61           | 1,71           | 1 190              | 560               | 213               |
| 568                 | 838            | 512            | 18             | 6              | 8 800                  | 17 000                   | 0,37                | 1,83           | 2,72           | 1,79           | 700                | 600               | 265               |
| 543                 | 652            | 516            | 18             | 4              | 2 600                  | 6 300                    | 0,17                | 3,9            | 5,81           | 3,81           | 400                | 670               | 540               |
| 550                 | 697            | 519            | 18             | 5              | 3 900                  | 8 500                    | 0,22                | 3,01           | 4,48           | 2,94           | 510                | 670               | 520               |
| 545                 | 697            | 516            | 28             | 5              | 4 900                  | 11 200                   | 0,29                | 2,32           | 3,45           | 2,26           | 850                | 560               | 360               |
| 578                 | 798            | 527            | 18             | 6              | 7 100                  | 14 300                   | 0,32                | 2,1            | 3,13           | 2,06           | 990                | 600               | 340               |
| 563                 | 798            | 516            | 29             | 6              | 8 650                  | 18 300                   | 0,39                | 1,73           | 2,58           | 1,69           | 1 340              | 530               | 199               |
| 593                 | 888            | 534            | 18             | 6              | 9 650                  | 18 300                   | 0,38                | 1,78           | 2,65           | 1,74           | 750                | 560               | 260               |
| 576                 | 692            | 546            | 18             | 4              | 2 850                  | 6 800                    | 0,18                | 3,85           | 5,73           | 3,76           | 385                | 630               | 500               |
| 589                 | 757            | 550            | 18             | 5              | 4 400                  | 9 500                    | 0,22                | 3,04           | 4,53           | 2,97           | 540                | 600               | 490               |
| 581                 | 757            | 544            | 29             | 5              | 6 000                  | 13 700                   | 0,31                | 2,15           | 3,2            | 2,1            | 910                | 530               | 340               |
| 609                 | 838            | 558            | 18             | 6              | 7 350                  | 15 300                   | 0,32                | 2,12           | 3,15           | 2,07           | 670                | 560               | 325               |
| 593                 | 838            | 546            | 29             | 6              | 9 500                  | 20 000                   | 0,38                | 1,77           | 2,64           | 1,73           | 1 450              | 500               | 180               |
| 630                 | 940            | 565            | 18             | 8              | 10 800                 | 20 800                   | 0,38                | 1,77           | 2,64           | 1,73           | 1 200              | 530               | 240               |
| 609                 | 732            | 577            | 18             | 4              | 3 100                  | 7 650                    | 0,17                | 3,95           | 5,88           | 3,86           | 570                | 600               | 465               |
| 619                 | 797            | 581            | 18             | 5              | 5 100                  | 11 000                   | 0,23                | 2,95           | 4,4            | 2,89           | 740                | 560               | 450               |
| 613                 | 797            | 573            | 29             | 5              | 6 400                  | 14 600                   | 0,31                | 2,2            | 3,27           | 2,15           | 1 050              | 500               | 320               |
| 644                 | 888            | 589            | 18             | 6              | 8 150                  | 16 600                   | 0,31                | 2,21           | 3,29           | 2,16           | 750                | 530               | 300               |
| 634                 | 888            | 577            | 32             | 6              | 10 600                 | 22 400                   | 0,38                | 1,77           | 2,64           | 1,73           | 1 600              | 480               | 167               |
| 663                 | 990            | 596            | 17             | 8              | 11 600                 | 22 400                   | 0,38                | 1,78           | 2,65           | 1,74           | 910                | 500               | 220               |

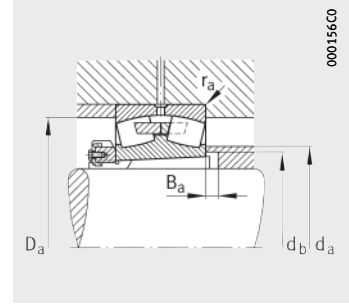


# Spherical roller bearings

With adapter sleeve



With central rib  
Locknut with retaining bracket



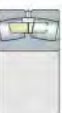
Mounting dimensions

**Dimension table** (continued) · Dimensions in mm

| Designation             |                 | Mass<br>m |                | Dimensions      |     |       |     |      |                |                |                |                |     |                |  |
|-------------------------|-----------------|-----------|----------------|-----------------|-----|-------|-----|------|----------------|----------------|----------------|----------------|-----|----------------|--|
| Bearing                 | Adapter sleeve  | Bearing   | Adapter sleeve | d <sub>1H</sub> | d   | D     | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | D <sub>m</sub> | l   | c <sub>1</sub> |  |
|                         |                 | ≈kg       | ≈kg            |                 |     |       |     | min. | ≈              |                |                |                |     | ≈              |  |
| <b>239/600-B-K-MB</b>   | <b>H39/600</b>  | 210       | 129            | <b>560</b>      | 600 | 800   | 150 | 5    | 740,5          | 12,5           | 23,5           | 700            | 239 | 96             |  |
| <b>230/600-B-K-MB</b>   | <b>H30/600</b>  | 388       | 149            | <b>560</b>      | 600 | 870   | 200 | 6    | 791,9          | 12,5           | 23,5           | 700            | 289 | 96             |  |
| <b>240/600-B-K30-MB</b> | <b>H240/600</b> | 544       | 171            | <b>560</b>      | 600 | 870   | 272 | 6    | 773,3          | 12,5           | 23,5           | 700            | 377 | 96             |  |
| <b>231/600-K-MB</b>     | <b>H31/600</b>  | 901       | 234            | <b>560</b>      | 600 | 980   | 300 | 7,5  | 852,6          | 12,5           | 23,5           | 750            | 399 | 107            |  |
| <b>241/600-B-K30-MB</b> | <b>H241/600</b> | 1 170     | 249            | <b>560</b>      | 600 | 980   | 375 | 7,5  | 833            | 12,5           | 23,5           | 750            | 490 | 107            |  |
| <b>232/600-B-K-MB</b>   | <b>H32/600</b>  | 1 560     | 279            | <b>560</b>      | 600 | 1 090 | 388 | 9,5  | 919,5          | 12,5           | 23,5           | 750            | 487 | 107            |  |
| <b>239/630-B-K-MB</b>   | <b>H39/630</b>  | 283       | 123            | <b>600</b>      | 630 | 850   | 165 | 6    | 784,5          | 12,5           | 23,5           | 730            | 254 | 96             |  |
| <b>230/630-B-K-MB</b>   | <b>H30/630</b>  | 480       | 139            | <b>600</b>      | 630 | 920   | 212 | 7,5  | 834,3          | 12,5           | 23,5           | 730            | 301 | 96             |  |
| <b>240/630-B-K30-MB</b> | <b>H240/630</b> | 649       | 157            | <b>600</b>      | 630 | 920   | 290 | 7,5  | 817,9          | 12,5           | 23,5           | 730            | 395 | 96             |  |
| <b>231/630-B-K-MB</b>   | <b>H31/630</b>  | 1 040     | 251            | <b>600</b>      | 630 | 1 030 | 315 | 7,5  | 896,2          | 12,5           | 23,5           | 800            | 424 | 117            |  |
| <b>241/630-B-K30-MB</b> | <b>H241/630</b> | 1 360     | 263            | <b>600</b>      | 630 | 1 030 | 400 | 7,5  | 872,2          | 12,5           | 23,5           | 800            | 525 | 117            |  |
| <b>232/630-B-K-MB</b>   | <b>H32/630</b>  | 1 885     | 297            | <b>600</b>      | 630 | 1 150 | 412 | 12   | 969,2          | 12,5           | 23,5           | 800            | 521 | 117            |  |
| <b>239/670-B-K-MB</b>   | <b>H39/670</b>  | 310       | 166            | <b>630</b>      | 670 | 900   | 170 | 6    | 831,5          | 12,5           | 23,5           | 780            | 264 | 101            |  |
| <b>230/670-B-K-MB</b>   | <b>H30/670</b>  | 590       | 194            | <b>630</b>      | 670 | 980   | 230 | 7,5  | 888,7          | 12,5           | 23,5           | 780            | 324 | 101            |  |
| <b>240/670-B-K30-MB</b> | <b>H240/670</b> | 813       | 218            | <b>630</b>      | 670 | 980   | 308 | 7,5  | 873,1          | 12,5           | 23,5           | 780            | 418 | 101            |  |
| <b>231/670-B-K-MB</b>   | <b>H31/670</b>  | 1 650     | 341            | <b>630</b>      | 670 | 1 090 | 336 | 7,5  | 948,2          | 12,5           | 23,5           | 850            | 456 | 128            |  |
| <b>241/670-B-K30-MB</b> | <b>H241/670</b> | 1 540     | 355            | <b>630</b>      | 670 | 1 090 | 412 | 7,5  | 929,4          | 12,5           | 23,5           | 850            | 548 | 128            |  |
| <b>232/670-B-K-MB</b>   | <b>H32/670</b>  | 2 240     | 402            | <b>630</b>      | 670 | 1 220 | 438 | 12   | 1 030,5        | 12,5           | 23,5           | 850            | 558 | 128            |  |
| <b>239/710-K-MB</b>     | <b>H39/710</b>  | 336       | 200            | <b>670</b>      | 710 | 950   | 180 | 6    | 877,5          | 12,5           | 23,5           | 830            | 286 | 111            |  |
| <b>230/710-B-K-MB</b>   | <b>H30/710</b>  | 650       | 228            | <b>670</b>      | 710 | 1 030 | 236 | 7,5  | 938,8          | 12,5           | 23,5           | 830            | 342 | 111            |  |
| <b>240/710-B-K30-MB</b> | <b>H240/710</b> | 873       | 254            | <b>670</b>      | 710 | 1 030 | 315 | 7,5  | 921,6          | 12,5           | 23,5           | 830            | 438 | 111            |  |
| <b>231/710-B-K-MB</b>   | <b>H31/710</b>  | 1 420     | 376            | <b>670</b>      | 710 | 1 150 | 345 | 9,5  | 1 006,6        | 12,5           | 23,5           | 900            | 467 | 131            |  |
| <b>241/710-B-K30-MB</b> | <b>H241/710</b> | 1 790     | 397            | <b>670</b>      | 710 | 1 150 | 438 | 9,5  | 980,2          | 12,5           | 23,5           | 900            | 577 | 131            |  |
| <b>232/710-B-K-MB</b>   | <b>H32/710</b>  | 2 550     | 444            | <b>670</b>      | 710 | 1 280 | 450 | 12   | 1 088,4        | 12,5           | 23,5           | 900            | 572 | 131            |  |
| <b>239/750-K-MB</b>     | <b>H39/750</b>  | 394       | 213            | <b>710</b>      | 750 | 1 000 | 185 | 6    | 923,2          | 12,5           | 23,5           | 870            | 291 | 111            |  |
| <b>249/750-B-K30-MB</b> | <b>H249/750</b> | 558       | 236            | <b>710</b>      | 750 | 1 000 | 250 | 6    | 921,7          | 12,5           | 23,5           | 870            | 367 | 111            |  |
| <b>230/750-K-MB</b>     | <b>H30/750</b>  | 786       | 248            | <b>710</b>      | 750 | 1 090 | 250 | 7,5  | 990,9          | 12,5           | 23,5           | 870            | 356 | 111            |  |
| <b>240/750-B-K30-MB</b> | <b>H240/750</b> | 1 070     | 278            | <b>710</b>      | 750 | 1 090 | 335 | 7,5  | 976,2          | 12,5           | 23,5           | 870            | 460 | 111            |  |
| <b>231/750-B-K-MB</b>   | <b>H31/750</b>  | 1 670     | 432            | <b>710</b>      | 750 | 1 220 | 365 | 9,5  | 1 067,4        | 12,5           | 23,5           | 950            | 493 | 137            |  |
| <b>241/750-B-K30-MB</b> | <b>H241/750</b> | 2 300     | 461            | <b>710</b>      | 750 | 1 220 | 475 | 9,5  | 1 035,8        | 12,5           | 23,5           | 950            | 622 | 137            |  |
| <b>232/750-B-K-MB</b>   | <b>H32/750</b>  | 3 050     | 508            | <b>710</b>      | 750 | 1 360 | 475 | 15   | 1 154,1        | 12,5           | 23,5           | 950            | 603 | 137            |  |
| <b>239/800-B-K-MB</b>   | <b>H39/800</b>  | 490       | 263            | <b>750</b>      | 800 | 1 060 | 195 | 6    | 983,7          | 12,5           | 23,5           | 920            | 303 | 111            |  |
| <b>230/800-K-MB</b>     | <b>H30/800</b>  | 861       | 305            | <b>750</b>      | 800 | 1 150 | 258 | 7,5  | 1 050,9        | 12,5           | 23,5           | 920            | 366 | 111            |  |
| <b>240/800-B-K30-MB</b> | <b>H240/800</b> | 1 190     | 349            | <b>750</b>      | 800 | 1 150 | 345 | 7,5  | 1 034,1        | 12,5           | 23,5           | 920            | 475 | 111            |  |

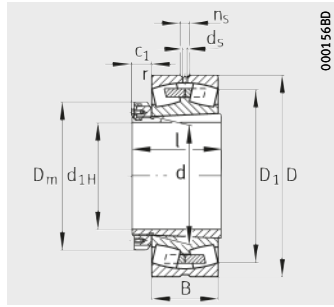


| Mounting dimensions |                |                |                |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------|----------------|----------------|----------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| d <sub>a</sub>      | D <sub>a</sub> | d <sub>b</sub> | B <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| max.                | max.           | min.           | min.           | max.           | kN                     | kN                       |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 653                 | 782            | 618            | 20             | 4              | 3 450                  | 8 650                    | 0,17                | 3,95           | 5,88           | 3,86           | 630                | 560               | 430               |
| 661                 | 847            | 622            | 20             | 5              | 5 700                  | 12 500                   | 0,22                | 3,07           | 4,57           | 3              | 890                | 530               | 405               |
| 655                 | 847            | 614            | 34             | 5              | 7 100                  | 16 600                   | 0,31                | 2,21           | 3,29           | 2,16           | 1 200              | 630               | 285               |
| 693                 | 948            | 629            | 20             | 6              | 9 000                  | 19 300                   | 0,31                | 2,2            | 3,27           | 2,15           | 810                | 500               | 270               |
| 678                 | 948            | 617            | 34             | 6              | 11 600                 | 26 000                   | 0,38                | 1,79           | 2,67           | 1,75           | 1 780              | 450               | 149               |
| 708                 | 1 050          | 638            | 19             | 8              | 12 900                 | 25 500                   | 0,37                | 1,83           | 2,72           | 1,79           | 1 740              | 480               | 190               |
| 688                 | 827            | 649            | 20             | 5              | 4 050                  | 9 800                    | 0,18                | 3,8            | 5,66           | 3,72           | 710                | 530               | 405               |
| 696                 | 892            | 653            | 20             | 6              | 6 300                  | 13 700                   | 0,22                | 3,01           | 4,48           | 2,94           | 890                | 500               | 380               |
| 690                 | 892            | 658            | 22             | 6              | 8 000                  | 19 000                   | 0,31                | 2,21           | 3,29           | 2,16           | 1 350              | 480               | 260               |
| 726                 | 998            | 662            | 20             | 6              | 9 800                  | 20 800                   | 0,31                | 2,21           | 3,29           | 2,16           | 1 430              | 480               | 260               |
| 710                 | 998            | 649            | 34             | 6              | 12 900                 | 29 000                   | 0,38                | 1,78           | 2,65           | 1,74           | 1 960              | 450               | 136               |
| 730                 | 1 102          | 670            | 20             | 10             | 14 300                 | 28 500                   | 0,37                | 1,8            | 2,69           | 1,76           | 1 370              | 450               | 180               |
| 730                 | 877            | 689            | 20             | 5              | 4 300                  | 10 600                   | 0,17                | 3,95           | 5,88           | 3,86           | 750                | 500               | 375               |
| 741                 | 952            | 694            | 20             | 6              | 7 200                  | 16 000                   | 0,22                | 3,01           | 4,48           | 2,94           | 1 100              | 480               | 350               |
| 736                 | 952            | 686            | 34             | 6              | 9 000                  | 21 600                   | 0,31                | 2,2            | 3,27           | 2,15           | 1 460              | 450               | 240               |
| 772                 | 1 058          | 704            | 20             | 6              | 11 000                 | 24 000                   | 0,31                | 2,21           | 3,29           | 2,16           | 1 560              | 450               | 220               |
| 757                 | 1 058          | 689            | 34             | 6              | 14 000                 | 31 500                   | 0,37                | 1,83           | 2,72           | 1,79           | 2 110              | 430               | 127               |
| 788                 | 1 172          | 714            | 19             | 10             | 16 300                 | 32 500                   | 0,37                | 1,8            | 2,69           | 1,76           | 2 150              | 430               | 160               |
| 770                 | 927            | 730            | 22             | 5              | 4 800                  | 12 000                   | 0,18                | 3,85           | 5,73           | 3,76           | 720                | 480               | 350               |
| 785                 | 1 002          | 735            | 23             | 6              | 7 650                  | 17 000                   | 0,22                | 3,07           | 4,57           | 3              | 1 140              | 480               | 325               |
| 780                 | 1 002          | 725            | 38             | 6              | 9 500                  | 22 800                   | 0,3                 | 2,26           | 3,37           | 2,21           | 1 550              | 430               | 223               |
| 813                 | 1 110          | 745            | 23             | 8              | 12 500                 | 27 000                   | 0,3                 | 2,25           | 3,34           | 2,2            | 1 810              | 450               | 200               |
| 799                 | 1 110          | 730            | 38             | 8              | 15 600                 | 35 500                   | 0,38                | 1,79           | 2,67           | 1,75           | 2 340              | 400               | 116               |
| 843                 | 1 232          | 754            | 21             | 10             | 17 300                 | 35 500                   | 0,37                | 1,83           | 2,72           | 1,79           | 2 300              | 430               | 150               |
| 810                 | 977            | 771            | 23             | 5              | 5 200                  | 12 900                   | 0,17                | 3,95           | 5,88           | 3,86           | 790                | 480               | 325               |
| 804                 | 977            | 765            | 32             | 5              | 7 200                  | 19 000                   | 0,22                | 3,1            | 4,62           | 3,03           | 1 180              | 430               | –                 |
| 828                 | 1 062          | 776            | 23             | 6              | 8 500                  | 19 000                   | 0,22                | 3,01           | 4,48           | 2,94           | 1 010              | 450               | 305               |
| 826                 | 1 062          | 768            | 40             | 6              | 10 800                 | 26 000                   | 0,3                 | 2,26           | 3,37           | 2,21           | 1 730              | 400               | 204               |
| 853                 | 1 180          | 786            | 23             | 8              | 14 000                 | 30 500                   | 0,29                | 2,3            | 3,42           | 2,25           | 1 990              | 430               | 190               |
| 845                 | 1 180          | 772            | 40             | 8              | 18 000                 | 40 500                   | 0,38                | 1,76           | 2,62           | 1,72           | 2 600              | 300               | 110               |
| 893                 | 1 302          | 796            | 21             | 12             | 19 300                 | 40 000                   | 0,37                | 1,83           | 2,72           | 1,79           | 2 550              | 400               | 140               |
| 865                 | 1 037          | 822            | 25             | 5              | 5 850                  | 15 000                   | 0,17                | 4,05           | 6,04           | 3,96           | 1 010              | 450               | 295               |
| 879                 | 1 122          | 828            | 25             | 6              | 9 300                  | 21 200                   | 0,22                | 3,07           | 4,57           | 3              | 1 430              | 430               | 280               |
| 880                 | 1 122          | 818            | 45             | 6              | 11 600                 | 28 500                   | 0,29                | 2,33           | 3,47           | 2,28           | 1 810              | 360               | 190               |

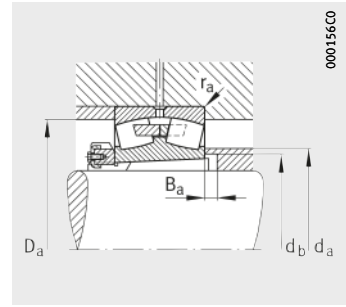


# Spherical roller bearings

With adapter sleeve



With central rib  
Locknut with retaining bracket



Mounting dimensions

Dimension table (continued) · Dimensions in mm

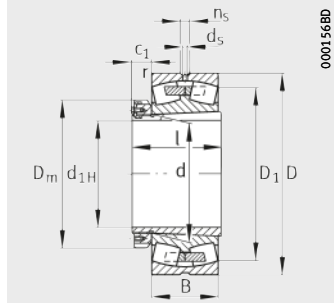
| Designation              |                  | Mass<br>m      |                       | Dimensions      |       |       |     |      |                |                |                |                |
|--------------------------|------------------|----------------|-----------------------|-----------------|-------|-------|-----|------|----------------|----------------|----------------|----------------|
| Bearing                  | Adapter sleeve   | Bearing<br>≈kg | Adapter sleeve<br>≈kg | d <sub>1H</sub> | d     | D     | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | D <sub>m</sub> |
|                          |                  |                |                       |                 |       |       |     | min. | ≈              |                |                |                |
| <b>231/800-K-MB</b>      | <b>H31/800</b>   | 2 400          | 515                   | <b>750</b>      | 800   | 1 280 | 375 | 9,5  | 1 119,1        | 12,5           | 23,5           | 1 000          |
| <b>241/800-B-K30-MB</b>  | <b>H241/800</b>  | 2 530          | 552                   | <b>750</b>      | 800   | 1 280 | 475 | 9,5  | 1 099,5        | 12,5           | 23,5           | 1 000          |
| <b>239/850-K-MB</b>      | <b>H39/850</b>   | 554            | 292                   | <b>800</b>      | 850   | 1 120 | 200 | 6    | 1 039,9        | 12,5           | 23,5           | 980            |
| <b>230/850-B-K-MB</b>    | <b>H30/850</b>   | 1 060          | 344                   | <b>800</b>      | 850   | 1 220 | 272 | 7,5  | 1 113,5        | 12,5           | 23,5           | 980            |
| <b>240/850-B-K30-MB</b>  | <b>H240/850</b>  | 1 420          | 393                   | <b>800</b>      | 850   | 1 220 | 365 | 7,5  | 1 092,9        | 12,5           | 23,5           | 980            |
| <b>231/850-B-K-MB</b>    | <b>H31/850</b>   | 2 340          | 590                   | <b>800</b>      | 850   | 1 360 | 400 | 12   | 1 198,1        | 12,5           | 23,5           | 1 060          |
| <b>241/850-B-K30-MB</b>  | <b>H241/850</b>  | 2 840          | 624                   | <b>800</b>      | 850   | 1 360 | 500 | 12   | 1 171,7        | 12,5           | 23,5           | 1 060          |
| <b>239/900-K-MB</b>      | <b>H39/900</b>   | 641            | 335                   | <b>850</b>      | 900   | 1 180 | 206 | 6    | 1 098,8        | 12,5           | 23,5           | 1 030          |
| <b>249/900-K30-MB</b>    | <b>H249/900</b>  | 854            | 364                   | <b>850</b>      | 900   | 1 180 | 280 | 6    | 1 088,6        | 12,5           | 23,5           | 1 030          |
| <b>230/900-B-K-MB</b>    | <b>H30/900</b>   | 1 280          | 392                   | <b>850</b>      | 900   | 1 280 | 280 | 7,5  | 1 171,3        | 12,5           | 23,5           | 1 030          |
| <b>240/900-B-K30-MB</b>  | <b>H240/900</b>  | 1 570          | 446                   | <b>850</b>      | 900   | 1 280 | 375 | 7,5  | 1 150,7        | 12,5           | 23,5           | 1 030          |
| <b>231/900-B-K-MB</b>    | <b>H31/900</b>   | 2 570          | 674                   | <b>850</b>      | 900   | 1 420 | 412 | 12   | 1 252,4        | 12,5           | 23,5           | 1 120          |
| <b>241/900-B-K30-MB</b>  | <b>H241/900</b>  | 3 040          | 712                   | <b>850</b>      | 900   | 1 420 | 515 | 12   | 1 230,4        | 12,5           | 23,5           | 1 120          |
| <b>239/950-B-K-MB</b>    | <b>H39/950</b>   | 746            | 369                   | <b>900</b>      | 950   | 1 250 | 224 | 7,5  | 1 162,5        | 12,5           | 23,5           | 1 080          |
| <b>230/950-B-K-MB</b>    | <b>H30/950</b>   | 1 420          | 432                   | <b>900</b>      | 950   | 1 360 | 300 | 7,5  | 1 244,7        | 12,5           | 23,5           | 1 080          |
| <b>240/950-B-K30-MB</b>  | <b>H240/950</b>  | 1 970          | 499                   | <b>900</b>      | 950   | 1 360 | 412 | 7,5  | 1 216          | 12,5           | 23,5           | 1 080          |
| <b>231/950-B-K-MB</b>    | <b>H31/950</b>   | 3 060          | 738                   | <b>900</b>      | 950   | 1 500 | 438 | 12   | 1 322,5        | 12,5           | 23,5           | 1 170          |
| <b>241/950-B-K30-MB</b>  | <b>H241/950</b>  | 3 820          | 776                   | <b>900</b>      | 950   | 1 500 | 545 | 12   | 1 306,7        | 12,5           | 23,5           | 1 170          |
| <b>230/1000-B-K-MB</b>   | <b>H30/1000</b>  | 1 590          | 474                   | <b>950</b>      | 1 000 | 1 420 | 308 | 7,5  | 1 300,3        | 12,5           | 23,5           | 1 140          |
| <b>240/1000-B-K30-MB</b> | <b>H240/1000</b> | 2 070          | 539                   | <b>950</b>      | 1 000 | 1 420 | 412 | 7,5  | 1 278,3        | 12,5           | 23,5           | 1 140          |
| <b>231/1000-K-MB</b>     | <b>H31/1000</b>  | 4 640          | 840                   | <b>950</b>      | 1 000 | 1 580 | 462 | 12   | 1 392,5        | 12,5           | 23,5           | 1 240          |
| <b>241/1000-B-K30-MB</b> | <b>H241/1000</b> | 4 380          | 886                   | <b>950</b>      | 1 000 | 1 580 | 580 | 12   | 1 372,6        | 12,5           | 23,5           | 1 240          |
| <b>239/1000-B-K-MB</b>   | <b>H39/1060</b>  | 1 080          | 493                   | <b>1 000</b>    | 1 060 | 1 400 | 250 | 7,5  | 1 307,6        | 12,5           | 23,5           | 1 200          |
| <b>230/1060-B-K-MB</b>   | <b>H30/1060</b>  | 1 920          | 574                   | <b>1 000</b>    | 1 060 | 1 500 | 325 | 9,5  | 1 374,4        | 12,5           | 23,5           | 1 200          |
| <b>240/1060-B-K30-MB</b> | <b>H240/1060</b> | 2 520          | 665                   | <b>1 000</b>    | 1 060 | 1 500 | 438 | 9,5  | 1 353,5        | 12,5           | 23,5           | 1 200          |
| <b>241/1060-B-K30-MB</b> | <b>H241/1060</b> | 5 000          | 1 060                 | <b>1 000</b>    | 1 060 | 1 660 | 600 | 15   | –              | 12,5           | 23,5           | 1 300          |
| <b>248/1060-B-K30-MB</b> | <b>H248/1060</b> | 599            | 263                   | <b>1 020</b>    | 1 060 | 1 280 | 218 | 6    | 1 212,7        | 9,5            | 17,7           | 1 150          |
| <b>239/1120-B-K-MB</b>   | <b>H39/1120</b>  | 1 160          | 521                   | <b>1 060</b>    | 1 120 | 1 460 | 250 | 7,5  | 1 368,1        | 12,5           | 23,5           | 1 260          |
| <b>230/1120-B-K-MB</b>   | <b>H30/1120</b>  | 2 210          | 631                   | <b>1 060</b>    | 1 120 | 1 580 | 345 | 9,5  | 1 447,7        | 12,5           | 23,5           | 1 260          |
| <b>240/1120-B-K30-MB</b> | <b>H240/1120</b> | 2 920          | 728                   | <b>1 060</b>    | 1 120 | 1 580 | 462 | 9,5  | 1 429,7        | 12,5           | 23,5           | 1 260          |
| <b>241/1120-B-K30-MB</b> | <b>H241/1120</b> | 5 800          | 1 170                 | <b>1 060</b>    | 1 120 | 1 750 | 630 | 15   | 1 527,2        | 12,5           | 23,5           | 1 360          |
| <b>239/1180-B-K-MB</b>   | <b>H39/1180</b>  | 1 340          | 576                   | <b>1 120</b>    | 1 180 | 1 540 | 272 | 7,5  | 1 438,3        | 12,5           | 23,5           | 1 320          |
| <b>230/1180-B-K-MB</b>   | <b>H30/1180</b>  | 2 510          | 682                   | <b>1 120</b>    | 1 180 | 1 660 | 355 | 9,5  | 1 523,4        | 12,5           | 23,5           | 1 320          |
| <b>241/1180-B-K30-MB</b> | <b>H241/1180</b> | 7 040          | 1 290                 | <b>1 120</b>    | 1 180 | 1 850 | 670 | 15   | 1 603,9        | 12,5           | 23,5           | 1 420          |

|     |                | Mounting dimensions |                |                |                |                | Basic load ratings  |                       | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|-----|----------------|---------------------|----------------|----------------|----------------|----------------|---------------------|-----------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| l   | c <sub>1</sub> | d <sub>a</sub>      | D <sub>a</sub> | d <sub>b</sub> | B <sub>a</sub> | r <sub>a</sub> | dyn. C <sub>r</sub> | stat. C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
|     | ≈              | max.                | max.           | min.           | min.           | max.           | kN                  | kN                    |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 505 | 137            | 909                 | 1 240          | 838            | 25             | 8              | 15 000              | 33 500                | 0,29                | 2,32           | 3,45           | 2,26           | 1 680              | 400               | 170               |
| 627 | 137            | 900                 | 1 240          | 823            | 45             | 8              | 18 600              | 44 000                | 0,36                | 1,86           | 2,77           | 1,82           | 2 430              | 340               | 95                |
| 308 | 115            | 917                 | 1 097          | 873            | 25             | 5              | 6 300               | 16 300                | 0,16                | 4,11           | 6,12           | 4,02           | 960                | 430               | 275               |
| 380 | 115            | 932                 | 1 192          | 879            | 25             | 6              | 10 400              | 23 600                | 0,22                | 3,07           | 4,57           | 3              | 1 540              | 400               | 260               |
| 495 | 115            | 930                 | 1 192          | 869            | 45             | 6              | 12 900              | 32 000                | 0,29                | 2,33           | 3,47           | 2,28           | 2 060              | 480               | 173               |
| 536 | 143            | 969                 | 1 312          | 890            | 25             | 10             | 17 000              | 38 000                | 0,29                | 2,32           | 3,45           | 2,26           | 2 410              | 360               | 160               |
| 658 | 143            | 955                 | 1 312          | 873            | 45             | 10             | 21 200              | 49 000                | 0,36                | 1,89           | 2,81           | 1,84           | 3 150              | 300               | 90                |
| 326 | 122            | 972                 | 1 157          | 923            | 27             | 5              | 6 550               | 17 300                | 0,16                | 4,28           | 6,37           | 4,19           | 1 010              | 400               | 260               |
| 410 | 122            | 958                 | 1 157          | 916            | 35             | 5              | 9 150               | 25 000                | 0,2                 | 3,31           | 4,92           | 3,23           | 1 070              | 340               | –                 |
| 400 | 122            | 990                 | 1 252          | 930            | 28             | 6              | 11 000              | 26 500                | 0,22                | 3,14           | 4,67           | 3,07           | 1 620              | 400               | 240               |
| 520 | 122            | 995                 | 1 252          | 919            | 52             | 6              | 14 000              | 36 500                | 0,28                | 2,45           | 3,64           | 2,39           | 2 190              | 300               | 150               |
| 557 | 150            | 1 015               | 1 372          | 941            | 28             | 10             | 18 000              | 40 500                | 0,29                | 2,33           | 3,47           | 2,28           | 2 550              | 340               | 150               |
| 685 | 150            | 1 010               | 1 372          | 924            | 52             | 10             | 22 400              | 53 000                | 0,35                | 1,91           | 2,85           | 1,87           | 2 900              | 280               | 80                |
| 344 | 122            | 1 030               | 1 222          | 974            | 27             | 6              | 7 500               | 20 000                | 0,16                | 4,22           | 6,29           | 4,13           | 1 280              | 360               | 240               |
| 420 | 122            | 1 048               | 1 332          | 980            | 28             | 6              | 12 200              | 29 000                | 0,22                | 3,14           | 4,67           | 3,07           | 1 810              | 340               | 220               |
| 557 | 122            | 1 035               | 1 332          | 971            | 52             | 6              | 16 300              | 41 500                | 0,29                | 2,32           | 3,45           | 2,26           | 2 550              | 280               | 140               |
| 583 | 150            | 1 075               | 1 452          | 992            | 28             | 10             | 20 000              | 45 500                | 0,29                | 2,33           | 3,47           | 2,28           | 2 210              | 300               | 140               |
| 715 | 150            | 1 060               | 1 452          | 975            | 52             | 10             | 23 600              | 54 000                | 0,36                | 1,87           | 2,79           | 1,83           | 1 720              | 260               | 80                |
| 430 | 122            | 1 100               | 1 392          | 1 030          | 30             | 6              | 13 200              | 31 500                | 0,21                | 3,2            | 4,77           | 3,13           | 1 570              | 340               | 200               |
| 562 | 122            | 1 090               | 1 392          | 971            | 60             | 6              | 16 600              | 42 500                | 0,28                | 2,41           | 3,59           | 2,35           | 2 550              | 260               | 140               |
| 609 | 150            | 1 135               | 1 532          | 1 044          | 30             | 10             | 22 000              | 51 000                | 0,29                | 2,33           | 3,47           | 2,28           | 3 150              | 280               | 130               |
| 755 | 150            | 1 110               | 1 532          | 1 028          | 60             | 10             | 27 500              | 64 000                | 0,35                | 1,91           | 2,85           | 1,87           | 4 000              | 260               | 70                |
| 372 | 122            | 1 150               | 1 372          | 1 088          | 30             | 6              | 9 800               | 26 000                | 0,17                | 4,05           | 6,04           | 3,96           | 1 590              | 300               | 200               |
| 447 | 122            | 1 170               | 1 466          | 1 095          | 30             | 8              | 14 300              | 35 500                | 0,21                | 3,27           | 4,87           | 3,2            | 1 740              | 280               | 240               |
| 588 | 122            | 1 150               | 1 466          | 1 083          | 60             | 8              | 18 600              | 50 000                | 0,27                | 2,47           | 3,67           | 2,41           | 2 950              | 260               | 120               |
| 775 | 150            | 1 200               | 1 602          | 1 089          | 60             | 12             | 29 000              | 69 500                | 0,35                | 1,95           | 2,9            | 1,91           | 4 100              | 260               | 67                |
| 335 | 101            | 1 110               | 1 257          | 1 075          | 45             | 5              | 6 950               | 22 800                | 0,15                | 4,54           | 6,75           | 4,43           | 1 280              | 280               | –                 |
| 372 | 122            | 1 200               | 1 432          | 1 148          | 30             | 6              | 10 200              | 27 500                | 0,16                | 4,28           | 6,37           | 4,19           | 1 740              | 280               | 190               |
| 467 | 122            | 1 245               | 1 546          | 1 156          | 30             | 8              | 15 000              | 38 000                | 0,21                | 3,27           | 4,87           | 3,2            | 2 130              | 260               | 180               |
| 612 | 122            | 1 210               | 1 546          | 1 144          | 60             | 8              | 20 800              | 55 000                | 0,28                | 2,45           | 3,64           | 2,39           | 3 250              | 260               | 110               |
| 805 | 150            | 1 260               | 1 692          | 1 150          | 60             | 12             | 31 000              | 72 000                | 0,35                | 1,91           | 2,85           | 1,87           | 3 950              | 240               | 60                |
| 394 | 122            | 1 270               | 1 512          | 1 210          | 30             | 6              | 11 400              | 31 000                | 0,17                | 4,05           | 6,04           | 3,96           | 1 760              | 260               | 180               |
| 479 | 122            | 1 290               | 1 626          | 1 218          | 32             | 8              | 16 600              | 41 500                | 0,21                | 3,27           | 4,87           | 3,2            | 2 400              | 260               | 170               |
| 845 | 150            | 1 350               | 1 792          | 1 210          | 60             | 12             | 35 500              | 86 500                | 0,34                | 1,99           | 2,96           | 1,94           | 4 900              | 220               | 53                |

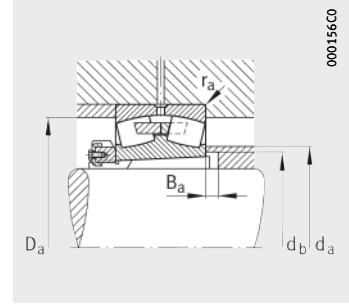


# Spherical roller bearings

With adapter sleeve



With central rib  
Locknut with retaining bracket



Mounting dimensions

**Dimension table** (continued) · Dimensions in mm

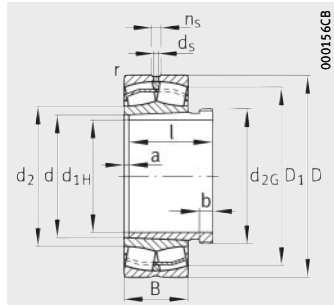
| Designation              |                  | Mass<br>m |                | Dimensions      |       |       |     |      |                |                |                |                |
|--------------------------|------------------|-----------|----------------|-----------------|-------|-------|-----|------|----------------|----------------|----------------|----------------|
| Bearing                  | Adapter sleeve   | Bearing   | Adapter sleeve | d <sub>1H</sub> | d     | D     | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | D <sub>m</sub> |
|                          |                  | ≈kg       | ≈kg            |                 |       |       |     | min. | ≈              |                |                |                |
| <b>239/1250-B-K-MB</b>   | <b>H39/1250</b>  | 1 630     | 708            | <b>1 180</b>    | 1 250 | 1 630 | 280 | 7,5  | 1 516,1        | 12,5           | 23,5           | 1 390          |
| <b>230/1250-B-K-MB</b>   | <b>H30/1250</b>  | 2 920     | 858            | <b>1 180</b>    | 1 250 | 1 750 | 375 | 9,5  | 1 607,6        | 12,5           | 23,5           | 1 390          |
| <b>240/1250-B-K30-MB</b> | <b>H240/1250</b> | 3 640     | 988            | <b>1 180</b>    | 1 250 | 1 750 | 500 | 9,5  | 1 580,6        | 12,5           | 23,5           | 1 390          |
| <b>241/1250-B-K30-MB</b> | <b>H241/1250</b> | 8 000     | 1 540          | <b>1 180</b>    | 1 250 | 1 950 | 710 | 15   | –              | 12,5           | 23,5           | 1 490          |
| <b>239/1320-B-K-MB</b>   | <b>H39/1320</b>  | 1 950     | 781            | <b>1 250</b>    | 1 320 | 1 720 | 300 | 7,5  | 1 602,2        | 12,5           | 23,5           | 1 460          |
| <b>239/1400-B-K-MB</b>   | <b>H39/1400</b>  | 2 200     | 924            | <b>1 320</b>    | 1 400 | 1 820 | 315 | 9,5  | 1 695,6        | 12,5           | 23,5           | 1 540          |
| <b>240/1400-B-K30-MB</b> | <b>H240/1400</b> | 5 170     | 1 290          | <b>1 320</b>    | 1 400 | 1 950 | 545 | 12   | 1 766,8        | 12,5           | 23,5           | 1 540          |
| <b>239/1500-B-K-MB</b>   | <b>H39/1500</b>  | 2 790     | 1 210          | <b>1 400</b>    | 1 500 | 1 950 | 335 | 9,5  | 1 817,2        | 12,5           | 23,5           | 1 650          |
| <b>240/1500-B-K30-MB</b> | <b>H240/1500</b> | 3 350     | 1 790          | <b>1 400</b>    | 1 500 | 2 120 | 615 | 12   | 1 905,3        | 12,5           | 23,5           | 1 650          |
| <b>231/1500-B-K-MB</b>   | <b>H31/1500</b>  | 5 530     | 2 230          | <b>1 400</b>    | 1 500 | 2 300 | 600 | 19   | 2 060,4        | 12,5           | 23,5           | 1 740          |
| <b>241/1500-B-K30-MB</b> | <b>H241/1500</b> | 12 200    | 2 560          | <b>1 400</b>    | 1 500 | 2 300 | 800 | 15   | 2 014          | 12,5           | 23,5           | 1 740          |
| <b>239/1600-B-K-MB</b>   | <b>H39/1600</b>  | 3 020     | 2 480          | <b>1 500</b>    | 1 600 | 2 060 | 345 | 9,5  | 1 919,2        | 12,5           | 23,5           | 1 730          |
| <b>239/1700-B-K-MB</b>   | <b>H39/1700</b>  | 3 550     | 2 620          | <b>1 600</b>    | 1 700 | 2 180 | 355 | 9,5  | 2 030,9        | 12,5           | 23,5           | 1 830          |

|     |                | Mounting dimensions |                |                |                |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|-----|----------------|---------------------|----------------|----------------|----------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| l   | c <sub>1</sub> | d <sub>a</sub>      | D <sub>a</sub> | d <sub>b</sub> | B <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
|     | ≈              | max.                | max.           | min.           | min.           | max.           | kN                     | kN                       |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| 407 | 132            | 1 345               | 1 602          | 1 210          | 35             | 8              | 12 000                 | 32 500                   | 0,15                | 4,47           | 6,65           | 4,37           | 1 970              | 260               | 160               |
| 509 | 132            | 1 380               | 1 716          | 1 290          | 34             | 8              | 18 000                 | 46 500                   | 0,2                 | 3,34           | 4,98           | 3,27           | 2 700              | 260               | 150               |
| 660 | 132            | 1 370               | 1 716          | 1 275          | 60             | 8              | 23 200                 | 62 000                   | 0,25                | 2,69           | 4              | 2,63           | 3 600              | 240               | –                 |
| 885 | 150            | 1 425               | 1 892          | 1 282          | 60             | 12             | 37 500                 | 91 500                   | 0,34                | 1,99           | 2,96           | 1,94           | 5 100              | 220               | 50                |
| 430 | 132            | 1 425               | 1 692          | 1 353          | 30             | 6              | 13 700                 | 39 000                   | 0,16                | 4,28           | 6,37           | 4,19           | 2 190              | 260               | 150               |
| 445 | 132            | 1 510               | 1 786          | 1 434          | 30             | 8              | 14 600                 | 42 500                   | 0,16                | 4,28           | 6,37           | 4,19           | 2 390              | 240               | 140               |
| 705 | 132            | 1 520               | 1 908          | 1 427          | 60             | 10             | 28 000                 | 76 500                   | 0,24                | 2,76           | 4,11           | 2,7            | 4 450              | 220               | 80                |
| 465 | 132            | 1 625               | 1 916          | 1 536          | 30             | 8              | 16 300                 | 49 000                   | 0,16                | 4,28           | 6,37           | 4,19           | 2 550              | 220               | 130               |
| 775 | 132            | 1 660               | 2 078          | 1 529          | 60             | 10             | 34 000                 | 93 000                   | 0,26                | 2,64           | 3,93           | 2,58           | 5 400              | 200               | –                 |
| 755 | 155            | 1 700               | 2 242          | 1 560          | 35             | 12             | 40 000                 | 96 500                   | 0,25                | 2,67           | 3,97           | 2,61           | 5 600              | 220               | 67                |
| 990 | 155            | 1 705               | 2 242          | 1 536          | 75             | 12             | 45 000                 | 110 000                  | 0,32                | 2,1            | 3,13           | 2,06           | 5 900              | 220               | 50                |
| 465 | 122            | 1 725               | 2 026          | 1 638          | 30             | 8              | 17 300                 | 52 000                   | 0,15                | 4,6            | 6,85           | 4,5            | 2 850              | 220               | 120               |
| 475 | 122            | 1 810               | 2 146          | 1 740          | 30             | 8              | 19 300                 | 60 000                   | 0,15                | 4,6            | 6,85           | 4,5            | –                  | 220               | 110               |

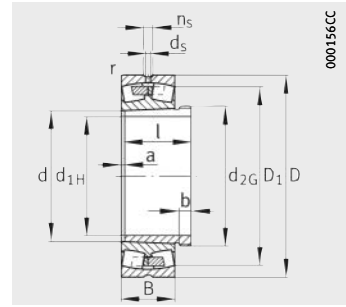


# Spherical roller bearings

With withdrawal sleeve



E1 design

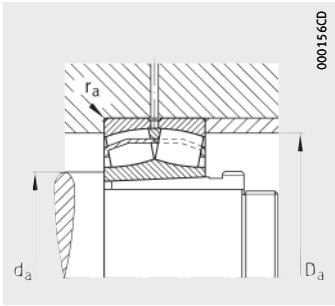


With central rib

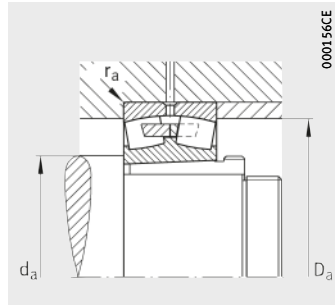
Dimension table - Dimensions in mm

| Designation                |        |                   | Mass<br>m      |                               | Dimensions      |     |     |     |     |                |                |                |                |    |    |
|----------------------------|--------|-------------------|----------------|-------------------------------|-----------------|-----|-----|-----|-----|----------------|----------------|----------------|----------------|----|----|
| Bearing                    | X-life | Withdrawal sleeve | Bearing<br>≈kg | With-<br>drawal sleeve<br>≈kg | d <sub>1H</sub> | d   | D   | B   | r   | D <sub>1</sub> | d <sub>2</sub> | d <sub>s</sub> | n <sub>s</sub> | a  | b  |
|                            |        |                   |                |                               |                 |     |     |     |     |                |                |                |                |    |    |
| 22330-E1-K                 | XL     | AHX2330G          | 41,2           | 2,64                          | 145             | 150 | 320 | 108 | 4   | 273,2          | 185,3          | 9,5            | 17,7           | 5  | 24 |
| 22330-E1-K-T41A            | XL     | AHX2330G          | 41,2           | 2,64                          | 145             | 150 | 320 | 108 | 4   | 273,2          | 185,3          | 9,5            | 17,7           | 5  | 24 |
| 22332-K-MB                 | -      | AH2332G           | 50,1           | 4,26                          | 150             | 160 | 340 | 114 | 4   | 288,3          | -              | 9,5            | 17,7           | 6  | 24 |
| 22334-K-MB                 | -      | AH2334G           | 58,4           | 4,78                          | 160             | 170 | 360 | 120 | 4   | 304,2          | -              | 9,5            | 17,7           | 6  | 24 |
| 22236-E1-K                 | XL     | AH2236G           | 28,5           | 3,35                          | 170             | 180 | 320 | 86  | 4   | 285,9          | 211,3          | 9,5            | 17,7           | 5  | 17 |
| 23236-E1A-K-M              | XL     | AH3236G           | 37             | 4,8                           | 170             | 180 | 320 | 112 | 4   | 277,3          | -              | 8              | 15             | 6  | 25 |
| 22336-K-MB                 | -      | AH2336G           | 66,7           | 5,42                          | 170             | 180 | 380 | 126 | 4   | 323,4          | -              | 12,5           | 23,5           | 6  | 26 |
| 23138-E1A-K-M              | XL     | AH3138G           | 32,4           | 4,39                          | 180             | 190 | 320 | 104 | 3   | 281,6          | -              | 8              | 15             | 6  | 20 |
| 24138-E1-K30 <sup>1)</sup> | XL     | AH24138           | 39,5           | 4,37                          | 180             | 190 | 320 | 128 | 2   | 269,7          | 217,5          | 6,3            | 12,2           | 13 | 18 |
| 22238-K-MB                 | -      | AH2238G           | 36,2           | 3,83                          | 180             | 190 | 340 | 92  | 4   | 296            | -              | 9,5            | 17,7           | 5  | 18 |
| 23238-B-K-MB               | -      | AH3238G           | 46             | 5,3                           | 180             | 190 | 340 | 120 | 4   | 291,2          | -              | 9,5            | 17,7           | 7  | 25 |
| 22338-K-MB                 | -      | AH2338G           | 77,3           | 6,02                          | 180             | 190 | 400 | 132 | 5   | 338,2          | -              | 12,5           | 23,5           | 7  | 26 |
| 23140-B-K-MB               | -      | AH3140            | 41,7           | 5,6                           | 190             | 200 | 340 | 112 | 3   | 293,3          | -              | 9,5            | 17,7           | 6  | 21 |
| 24140-B-K30                | -      | AH24140           | 51,6           | 5,02                          | 190             | 200 | 340 | 140 | 3   | 285,9          | -              | 6,3            | 12,2           | 13 | 18 |
| 22240-B-K-MB               | -      | AH2240            | 42,3           | 4,8                           | 190             | 200 | 360 | 98  | 4   | 312            | -              | 9,5            | 17,7           | 5  | 19 |
| 23240-B-K-MB               | -      | AH3240            | 55,8           | 6,61                          | 190             | 200 | 360 | 128 | 4   | 307,5          | -              | 9,5            | 17,7           | 7  | 24 |
| 22340-K-MB                 | -      | AH2340            | 89,5           | 7,64                          | 190             | 200 | 420 | 138 | 5   | 357,4          | -              | 12,5           | 23,5           | 7  | 30 |
| 23044-K-MB                 | -      | AH3044G           | 30,3           | 7,18                          | 200             | 220 | 340 | 90  | 3   | 301,8          | -              | 8              | 15             | 6  | 20 |
| 24044-B-K30-MB             | -      | AH24044           | 38,9           | 8,22                          | 200             | 220 | 340 | 118 | 3   | 297,4          | -              | 6,3            | 12,2           | 14 | 18 |
| 23144-B-K-MB               | -      | AH3144            | 52             | 10,4                          | 200             | 220 | 370 | 120 | 4   | 319,2          | -              | 9,5            | 17,7           | 6  | 23 |
| 24144-B-K30                | -      | AH24144           | 64,4           | 10,3                          | 200             | 220 | 370 | 150 | 4   | 311,7          | -              | 6,3            | 12,2           | 14 | 20 |
| 22244-B-K-MB               | -      | AH2244            | 59,6           | 9,17                          | 200             | 220 | 400 | 108 | 4   | 348,7          | -              | 9,5            | 17,7           | 6  | 20 |
| 23244-K-MB                 | -      | AH2344            | 79             | 13,6                          | 200             | 220 | 400 | 144 | 4   | 337,6          | -              | 9,5            | 17,7           | 8  | 30 |
| 22344-K-MB                 | -      | AH2344            | 114            | 13,6                          | 200             | 220 | 460 | 145 | 5   | 391,2          | -              | 12,5           | 23,5           | 8  | 30 |
| 23948-K-MB                 | -      | AH3948            | 13,4           | 5,26                          | 220             | 240 | 320 | 60  | 2,1 | 297,8          | -              | 6,3            | 12,2           | 6  | 16 |
| 23048-K-MB                 | -      | AH3048            | 31,9           | 8,92                          | 220             | 240 | 360 | 92  | 3   | 322,1          | -              | 8              | 15             | 7  | 21 |
| 24048-B-K30-MB             | -      | AH24048           | 43,2           | 9,03                          | 220             | 240 | 360 | 118 | 3   | 318,9          | -              | 6,3            | 12,2           | 15 | 20 |
| 23148-B-K-MB               | -      | AH3148            | 65,3           | 12,3                          | 220             | 240 | 400 | 128 | 4   | 346,2          | -              | 9,5            | 17,7           | 7  | 25 |
| 24148-B-K30                | -      | AH24148           | 78,7           | 12,6                          | 220             | 240 | 400 | 160 | 4   | 338            | -              | 6,3            | 12,2           | 15 | 20 |
| 22248-B-K-MB               | -      | AH2248            | 81,2           | 11,3                          | 220             | 240 | 440 | 120 | 4   | 380,7          | -              | 12,5           | 23,5           | 6  | 21 |
| 23248-B-K-MB               | -      | AH2348            | 105            | 15,6                          | 220             | 240 | 440 | 160 | 4   | 371            | -              | 12,5           | 23,5           | 8  | 30 |
| 22348-K-MB                 | -      | AH2348            | 145            | 15,6                          | 220             | 240 | 500 | 155 | 5   | 420            | -              | 12,5           | 23,5           | 8  | 30 |
| 23952-K-MB                 | -      | AH3952G           | 22,4           | 7,7                           | 240             | 260 | 360 | 75  | 2,1 | 330,5          | -              | 8              | 15             | 6  | 18 |
| 23052-K-MB                 | -      | AH3052            | 46,2           | 10,8                          | 240             | 260 | 400 | 104 | 4   | 357,2          | -              | 9,5            | 17,7           | 7  | 23 |
| 24052-B-K30-MB             | -      | AH24052           | 64,5           | 11,6                          | 240             | 260 | 400 | 140 | 4   | 349,1          | -              | 6,3            | 12,2           | 16 | 20 |

<sup>1)</sup> Cage guidance on inner ring central rib.

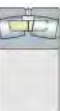


Mounting dimensions  
E1 design



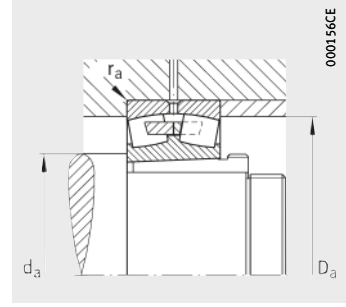
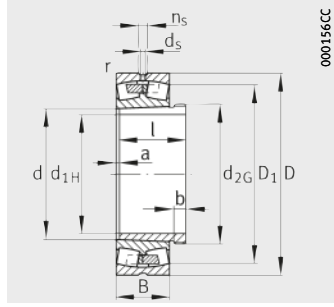
Mounting dimensions  
With central rib

| Thread<br>$d_{2G}$ | l   | Mounting dimensions |               |               | Basic load ratings  |                         | Calculation factors |       |       |       | Fatigue<br>limit load<br>$C_{ur}$<br>kN | Limiting<br>speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference<br>speed<br>$n_B$<br>$\text{min}^{-1}$ |
|--------------------|-----|---------------------|---------------|---------------|---------------------|-------------------------|---------------------|-------|-------|-------|---|---|--|
|                    |     | $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | e                   | $Y_1$ | $Y_2$ | $Y_0$ |   |   |  |
| M160X3             | 135 | 167                 | 303           | 3             | 1 640               | 1 850                   | 0,33                | 2,02  | 3     | 1,97  | 148                                     | 2 200   | 1 520  |
| M160X3             | 135 | 167                 | 303           | 3             | 1 640               | 1 850                   | 0,33                | 2,02  | 3     | 1,97  | 148                                     | 2 200   | 1 520  |
| M170X3             | 140 | 177                 | 323           | 3             | 1 430               | 1 900                   | 0,37                | 1,8   | 2,69  | 1,76  | 121                                     | 2 000   | 1 500  |
| M180X3             | 146 | 187                 | 343           | 3             | 1 600               | 2 120                   | 0,37                | 1,83  | 2,72  | 1,79  | 134                                     | 1 800   | 1 380  |
| M190X3             | 105 | 197                 | 303           | 3             | 1 360               | 1 680                   | 0,25                | 2,71  | 4,04  | 2,65  | 148                                     | 2 400   | 1 670  |
| M190X3             | 140 | 197                 | 303           | 3             | 1 710               | 2 340                   | 0,33                | 2,07  | 3,09  | 2,03  | 173                                     | 2 000   | 1 090  |
| M190X3             | 154 | 197                 | 363           | 3             | 1 760               | 2 360                   | 0,37                | 1,83  | 2,72  | 1,79  | 209                                     | 1 500   | 1 270  |
| M200X3             | 125 | 204                 | 306           | 2,5           | 1 610               | 2 220                   | 0,3                 | 2,28  | 3,39  | 2,23  | 218                                     | 2 000   | 1 260  |
| M200X3             | 146 | 204                 | 306           | 2,5           | 1 670               | 2 500                   | 0,37                | 1,82  | 2,7   | 1,78  | 226                                     | 1 400   | 880  |
| M200X3             | 112 | 207                 | 323           | 3             | 1 200               | 1 830                   | 0,28                | 2,39  | 3,56  | 2,34  | 122                                     | 1 800   | 1 600  |
| M200X3             | 145 | 207                 | 323           | 3             | 1 560               | 2 600                   | 0,36                | 1,86  | 2,77  | 1,82  | 156                                     | 1 700   | 1 020  |
| M200X3             | 160 | 210                 | 380           | 4             | 1 860               | 2 500                   | 0,37                | 1,83  | 2,72  | 1,79  | 213                                     | 1 500   | 1 220  |
| Tr220X4            | 134 | 214                 | 326           | 2,5           | 1 320               | 2 280                   | 0,35                | 1,95  | 2,9   | 1,91  | 131                                     | 1 700   | 1 230  |
| Tr210X4            | 158 | 214                 | 326           | 2,5           | 1 700               | 3 000                   | 0,42                | 1,62  | 2,42  | 1,59  | 190                                     | 1 400   | 810  |
| Tr220X4            | 118 | 217                 | 343           | 3             | 1 320               | 2 000                   | 0,29                | 2,35  | 3,5   | 2,3   | 123                                     | 1 700   | 1 530  |
| Tr220X4            | 153 | 217                 | 343           | 3             | 1 660               | 2 750                   | 0,37                | 1,83  | 2,72  | 1,79  | 163                                     | 1 500   | 980  |
| Tr220X4            | 170 | 220                 | 400           | 4             | 2 080               | 2 800                   | 0,36                | 1,87  | 2,79  | 1,83  | 189                                     | 1 400   | 1 120  |
| Tr230X4            | 111 | 232,4               | 327,6         | 2,5           | 1 100               | 2 000                   | 0,26                | 2,55  | 3,8   | 2,5   | 132                                     | 1 700   | 1 440  |
| Tr230X4            | 138 | 232,4               | 327,6         | 2,5           | 1 400               | 2 700                   | 0,34                | 1,96  | 2,92  | 1,92  | 139                                     | 1 300   | 1 070  |
| Tr240X4            | 145 | 237                 | 353           | 3             | 1 630               | 2 900                   | 0,33                | 2,03  | 3,02  | 1,98  | 165                                     | 1 400   | 1 060  |
| Tr230X4            | 170 | 237                 | 353           | 3             | 1 900               | 3 450                   | 0,41                | 1,63  | 2,43  | 1,6   | 197                                     | 1 300   | 720  |
| Tr240X4            | 130 | 237                 | 383           | 3             | 1 630               | 2 450                   | 0,29                | 2,35  | 3,5   | 2,3   | 153                                     | 1 400   | 1 300  |
| Tr240X4            | 181 | 237                 | 383           | 3             | 2 040               | 3 450                   | 0,37                | 1,83  | 2,72  | 1,79  | 181                                     | 1 400   | 850  |
| Tr240X4            | 181 | 240                 | 440           | 4             | 2 320               | 3 350                   | 0,35                | 1,95  | 2,9   | 1,91  | 217                                     | 1 300   | 970  |
| Tr250X4            | 77  | 250,2               | 309,8         | 2,1           | 640                 | 1 370                   | 0,17                | 4,05  | 6,04  | 3,96  | 93                                      | 1 500   | 1 310  |
| Tr260X4            | 116 | 252,4               | 347,6         | 2,5           | 1 160               | 2 200                   | 0,25                | 2,74  | 4,08  | 2,68  | 130                                     | 1 400   | 1 310  |
| Tr250X4            | 138 | 252,4               | 347,6         | 2,5           | 1 500               | 2 900                   | 0,32                | 2,1   | 3,13  | 2,06  | 150                                     | 1 300   | 970  |
| Tr260X4            | 154 | 257                 | 383           | 3             | 1 860               | 3 250                   | 0,33                | 2,06  | 3,06  | 2,01  | 177                                     | 1 300   | 970  |
| Tr260X4            | 180 | 257                 | 383           | 3             | 2 120               | 3 900                   | 0,41                | 1,66  | 2,47  | 1,62  | 231                                     | 1 200   | 660  |
| Tr260X4            | 144 | 257                 | 423           | 3             | 1 960               | 3 050                   | 0,29                | 2,35  | 3,5   | 2,3   | 184                                     | 1 300   | 1 180  |
| Tr260X4            | 189 | 257                 | 423           | 3             | 2 450               | 4 250                   | 0,37                | 1,8   | 2,69  | 1,76  | 231                                     | 1 300   | 750  |
| Tr260X4            | 189 | 260                 | 480           | 4             | 2 650               | 3 900                   | 0,35                | 1,95  | 2,9   | 1,91  | 249                                     | 1 500   | 870  |
| Tr280X4            | 94  | 270,2               | 349,8         | 2,1           | 930                 | 1 930                   | 0,19                | 3,54  | 5,27  | 3,46  | 108                                     | 1 400   | 1 190  |
| Tr280X4            | 128 | 274,6               | 385,4         | 3             | 1 500               | 2 800                   | 0,26                | 2,64  | 3,93  | 2,58  | 155                                     | 1 300   | 1 160  |
| Tr270X4            | 162 | 274,6               | 385,4         | 3             | 1 900               | 3 800                   | 0,35                | 1,94  | 2,88  | 1,89  | 204                                     | 1 100   | 870  |



# Spherical roller bearings

With withdrawal sleeve



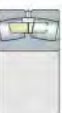
Mounting dimensions

Dimension table (continued) · Dimensions in mm

| Designation    |                   | Mass<br>m |                        | Dimensions      |     |     |     |      |                |                |                |    |    |
|----------------|-------------------|-----------|------------------------|-----------------|-----|-----|-----|------|----------------|----------------|----------------|----|----|
| Bearing        | Withdrawal sleeve | Bearing   | With-<br>drawal sleeve | d <sub>1H</sub> | d   | D   | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | a  | b  |
|                |                   | ≈kg       | ≈kg                    |                 |     |     |     | min. | ≈              |                |                | ≈  |    |
| 23152-K-MB     | AH3152G           | 89,6      | 15,1                   | 240             | 260 | 440 | 144 | 4    | 379,7          | 9,5            | 17,7           | 7  | 26 |
| 24152-B-K30    | AH24152           | 112       | 15,5                   | 240             | 260 | 440 | 180 | 4    | 370,3          | 8              | 15             | 16 | 22 |
| 22252-B-K-MB   | AH2252G           | 106       | 13,3                   | 240             | 260 | 480 | 130 | 5    | 415,3          | 12,5           | 23,5           | 6  | 23 |
| 23252-B-K-MB   | AH2352G           | 136       | 18,7                   | 240             | 260 | 480 | 174 | 5    | 405,4          | 12,5           | 23,5           | 8  | 30 |
| 22352-K-MB     | AH2352G           | 177       | 18,7                   | 240             | 260 | 540 | 165 | 6    | 452,1          | 12,5           | 23,5           | 8  | 30 |
| 23956-K-MB     | AH3956G           | 24,7      | 8,3                    | 260             | 280 | 380 | 75  | 2,1  | 350            | 8              | 15             | 6  | 18 |
| 23056-B-K-MB   | AH3056            | 50,3      | 12                     | 260             | 280 | 420 | 106 | 4    | 376,5          | 9,5            | 17,7           | 8  | 24 |
| 24056-B-K30-MB | AH24056           | 69,7      | 12,6                   | 260             | 280 | 420 | 140 | 4    | 369,5          | 6,3            | 12,2           | 17 | 22 |
| 23156-B-K-MB   | AH3156G           | 96,4      | 16,7                   | 260             | 280 | 460 | 146 | 5    | 401,4          | 9,5            | 17,7           | 8  | 28 |
| 24156-B-K30    | AH24156           | 118       | 16,7                   | 260             | 280 | 460 | 180 | 5    | 392,8          | 8              | 15             | 17 | 22 |
| 22256-B-K-MB   | AH2256G           | 110       | 14,4                   | 260             | 280 | 500 | 130 | 5    | 435,2          | 12,5           | 23,5           | 8  | 24 |
| 23256-K-MB     | AH2356G           | 153       | 20,9                   | 260             | 280 | 500 | 176 | 5    | 426,3          | 12,5           | 23,5           | 8  | 30 |
| 22356-K-MB     | AH2356G           | 224       | 20,9                   | 260             | 280 | 580 | 175 | 6    | 489,3          | 12,5           | 23,5           | 8  | 30 |
| 23960-B-K-MB   | AH3960G           | 39,1      | 10,8                   | 280             | 300 | 420 | 90  | 3    | 384,6          | 9,5            | 17,7           | 7  | 21 |
| 23060-K-MB     | AH3060            | 72,2      | 14,4                   | 280             | 300 | 460 | 118 | 4    | 412,6          | 9,5            | 17,7           | 8  | 26 |
| 24060-B-K30-MB | AH24060           | 97,7      | 15,5                   | 280             | 300 | 460 | 160 | 4    | 401,5          | 8              | 15             | 18 | 24 |
| 23160-B-K-MB   | AH3160G           | 123       | 20                     | 280             | 300 | 500 | 160 | 5    | 434,7          | 9,5            | 17,7           | 8  | 30 |
| 24160-B-K30    | AH24160           | 158       | 20,1                   | 280             | 300 | 500 | 200 | 5    | 424,4          | 8              | 15             | 18 | 24 |
| 22260-K-MB     | AH2260G           | 136       | 17,2                   | 280             | 300 | 540 | 140 | 5    | 468,8          | 12,5           | 23,5           | 8  | 26 |
| 23260-K-MB     | AH3260G           | 192       | 24,6                   | 280             | 300 | 540 | 192 | 5    | 458,7          | 12,5           | 23,5           | 8  | 34 |
| 22360-K-MB     | AH3260G           | 365       | 24,6                   | 280             | 300 | 620 | 185 | 7,5  | 523,6          | 12,5           | 23,5           | 8  | 34 |
| 23964-K-MB     | AH3964G           | 41        | 11,4                   | 300             | 320 | 440 | 90  | 3    | 406,2          | 9,5            | 17,7           | 7  | 21 |
| 23064-K-MB     | AH3064G           | 77,1      | 15,8                   | 300             | 320 | 480 | 121 | 4    | 432,6          | 9,5            | 17,7           | 8  | 27 |
| 24064-B-K30-MB | AH24064           | 103       | 17,5                   | 300             | 320 | 480 | 160 | 4    | 424            | 8              | 15             | 18 | 24 |
| 23164-K-MB     | AH3164G           | 167       | 23,6                   | 300             | 320 | 540 | 176 | 5    | 466,2          | 12,5           | 23,5           | 8  | 31 |
| 24164-B-K30    | AH24164           | 197       | 23,4                   | 300             | 320 | 540 | 218 | 5    | 456,1          | 9,5            | 17,7           | 18 | 24 |
| 22264-K-MB     | AH2264G           | 166       | 19,8                   | 300             | 320 | 580 | 150 | 5    | 503,5          | 12,5           | 23,5           | 10 | 27 |
| 23264-K-MB     | AH3264G           | 229       | 28,9                   | 300             | 320 | 580 | 208 | 5    | 489,6          | 12,5           | 23,5           | 8  | 36 |
| 22364-B-K-MB   | AH3264G           | 433       | 28,9                   | 300             | 320 | 670 | 200 | 7,5  | 568,1          | 12,5           | 23,5           | 8  | 36 |
| 23068-K-MB     | AH3068G           | 101       | 18,6                   | 320             | 340 | 520 | 133 | 5    | 464,6          | 12,5           | 23,5           | 9  | 28 |
| 24068-B-K30-MB | AH24068           | 143       | 21,1                   | 320             | 340 | 520 | 180 | 5    | 457,1          | 9,5            | 17,7           | 19 | 26 |
| 23168-B-K-MB   | AH3168G           | 203       | 27,6                   | 320             | 340 | 580 | 190 | 5    | 499,5          | 12,5           | 23,5           | 9  | 33 |
| 24168-B-K30    | AH24168           | 260       | 28                     | 320             | 340 | 580 | 243 | 5    | 481,1          | 9,5            | 17,7           | 19 | 26 |
| 23268-B-K-MB   | AH3268G           | 291       | 33,7                   | 320             | 340 | 620 | 224 | 6    | 521,2          | 12,5           | 23,5           | 9  | 38 |

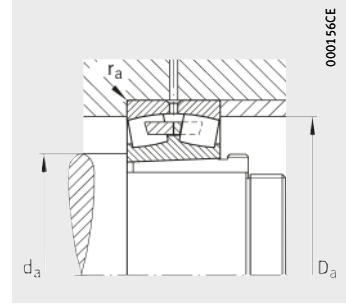
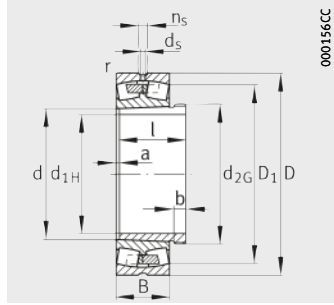


|                           |     | Mounting dimensions |                |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------------|-----|---------------------|----------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| Thread<br>d <sub>2G</sub> | l   | d <sub>a</sub>      | D <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈                         | ≈   | min.                | max.           | max.           | kN                     | kN                       |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| Tr280X4                   | 172 | 277                 | 423            | 3              | 2 200                  | 4 000                    | 0,33                | 2,03           | 3,02           | 1,98           | 213                | 1 200             | 850               |
| Tr280X4                   | 202 | 277                 | 423            | 3              | 2 700                  | 5 100                    | 0,42                | 1,61           | 2,4            | 1,58           | 315                | 1 100             | 550               |
| Tr280X4                   | 155 | 280                 | 460            | 4              | 2 240                  | 3 450                    | 0,29                | 2,32           | 3,45           | 2,26           | 217                | 1 100             | 1 070             |
| Tr280X4                   | 205 | 280                 | 460            | 4              | 2 900                  | 4 900                    | 0,37                | 1,8            | 2,69           | 1,76           | 270                | 1 100             | 660               |
| Tr280X4                   | 205 | 286                 | 514            | 5              | 3 000                  | 4 400                    | 0,34                | 2              | 2,98           | 1,96           | 290                | 1 100             | 790               |
| Tr300X4                   | 94  | 290,2               | 369,8          | 2,1            | 970                    | 2 040                    | 0,18                | 3,76           | 5,59           | 3,67           | 129                | 1 300             | 1 100             |
| Tr300X4                   | 131 | 294,6               | 405,4          | 3              | 1 560                  | 3 000                    | 0,25                | 2,74           | 4,08           | 2,68           | 156                | 1 300             | 1 090             |
| Tr290X4                   | 162 | 294,6               | 405,4          | 3              | 2 000                  | 4 000                    | 0,33                | 2,04           | 3,04           | 2              | 225                | 1 100             | 810               |
| Tr300X4                   | 175 | 300                 | 440            | 4              | 2 360                  | 4 400                    | 0,32                | 2,12           | 3,15           | 2,07           | 241                | 1 100             | 780               |
| Tr300X4                   | 202 | 300                 | 440            | 4              | 2 700                  | 5 200                    | 0,39                | 1,71           | 2,54           | 1,67           | 365                | 1 000             | 520               |
| Tr300X4                   | 155 | 300                 | 480            | 4              | 2 360                  | 3 650                    | 0,28                | 2,43           | 3,61           | 2,37           | 238                | 1 100             | 1 010             |
| Tr300X4                   | 212 | 300                 | 480            | 4              | 3 000                  | 5 300                    | 0,36                | 1,86           | 2,77           | 1,82           | 260                | 1 100             | 620               |
| Tr300X4                   | 212 | 306                 | 554            | 5              | 3 550                  | 5 400                    | 0,33                | 2,03           | 3,02           | 1,98           | 335                | 950               | 680               |
| Tr320X5                   | 112 | 312,4               | 407,6          | 2,5            | 1 270                  | 2 650                    | 0,2                 | 3,42           | 5,09           | 3,34           | 165                | 1 190             | 1 000             |
| Tr320X5                   | 145 | 314,6               | 445,4          | 3              | 1 960                  | 3 650                    | 0,25                | 2,69           | 4              | 2,63           | 223                | 1 100             | 960               |
| Tr310X4                   | 184 | 314,6               | 445,4          | 3              | 2 500                  | 5 200                    | 0,35                | 1,95           | 2,9            | 1,91           | 300                | 1 000             | 700               |
| Tr320X5                   | 192 | 320                 | 480            | 4              | 2 650                  | 4 900                    | 0,33                | 2,06           | 3,06           | 2,01           | 270                | 1 100             | 720               |
| Tr320X5                   | 224 | 320                 | 480            | 4              | 3 250                  | 6 300                    | 0,4                 | 1,67           | 2,49           | 1,63           | 540                | 900               | 455               |
| Tr320X5                   | 170 | 320                 | 520            | 4              | 2 750                  | 4 400                    | 0,27                | 2,47           | 3,67           | 2,41           | 300                | 1 000             | 900               |
| Tr320X5                   | 228 | 320                 | 520            | 4              | 3 450                  | 6 200                    | 0,37                | 1,83           | 2,72           | 1,79           | 300                | 1 000             | 560               |
| Tr320X5                   | 228 | 332                 | 588            | 6              | 4 000                  | 6 100                    | 0,33                | 2,06           | 3,06           | 2,01           | 375                | 900               | 630               |
| Tr340X5                   | 112 | 332,4               | 427,6          | 2,5            | 1 310                  | 2 750                    | 0,19                | 3,62           | 5,39           | 3,54           | 202                | 1 100             | 930               |
| Tr340X5                   | 149 | 334,6               | 465,4          | 3              | 2 040                  | 4 000                    | 0,25                | 2,74           | 4,08           | 2,68           | 243                | 1 100             | 900               |
| Tr340X5                   | 184 | 334,6               | 465,4          | 3              | 2 600                  | 5 400                    | 0,33                | 2,06           | 3,06           | 2,01           | 360                | 950               | 660               |
| Tr340X5                   | 209 | 340                 | 520            | 4              | 3 200                  | 6 000                    | 0,34                | 1,98           | 2,94           | 1,93           | 305                | 950               | 650               |
| Tr340X5                   | 242 | 340                 | 520            | 4              | 3 800                  | 7 350                    | 0,41                | 1,65           | 2,46           | 1,61           | 530                | 850               | 415               |
| Tr340X5                   | 180 | 340                 | 560            | 4              | 3 050                  | 4 900                    | 0,27                | 2,47           | 3,67           | 2,41           | 345                | 950               | 830               |
| Tr340X5                   | 246 | 340                 | 560            | 4              | 3 900                  | 6 950                    | 0,37                | 1,8            | 2,69           | 1,76           | 330                | 950               | 510               |
| Tr340X5                   | 246 | 352                 | 638            | 6              | 4 400                  | 6 800                    | 0,33                | 2,06           | 3,06           | 2,01           | 540                | 800               | 560               |
| Tr360X5                   | 162 | 358                 | 502            | 4              | 2 360                  | 4 550                    | 0,25                | 2,69           | 4              | 2,63           | 285                | 1 000             | 840               |
| Tr360X5                   | 206 | 358                 | 502            | 4              | 3 100                  | 6 550                    | 0,34                | 1,98           | 2,94           | 1,93           | 530                | 850               | 600               |
| Tr360X5                   | 225 | 360                 | 560            | 4              | 3 650                  | 6 950                    | 0,34                | 1,98           | 2,94           | 1,93           | 570                | 900               | 590               |
| Tr360X5                   | 269 | 360                 | 560            | 4              | 4 400                  | 8 500                    | 0,43                | 1,56           | 2,32           | 1,53           | 680                | 800               | 380               |
| Tr360X5                   | 264 | 366                 | 594            | 5              | 4 500                  | 8 150                    | 0,38                | 1,78           | 2,65           | 1,74           | 650                | 850               | 465               |



# Spherical roller bearings

With withdrawal sleeve



Mounting dimensions

Dimension table (continued) · Dimensions in mm

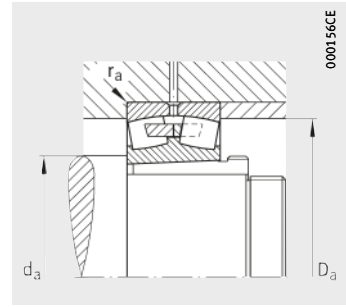
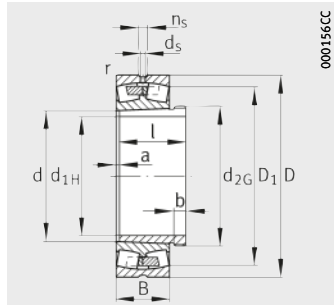
| Designation           |                   | Mass<br>m |                   | Dimensions      |     |     |     |      |                |                |                |    |    |
|-----------------------|-------------------|-----------|-------------------|-----------------|-----|-----|-----|------|----------------|----------------|----------------|----|----|
| Bearing               | Withdrawal sleeve | Bearing   | Withdrawal sleeve | d <sub>1H</sub> | d   | D   | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | a  | b  |
|                       |                   | ≈kg       | ≈kg               |                 |     |     |     | min. | ≈              |                |                | ≈  |    |
| <b>23972-K-MB</b>     | <b>AH3972G</b>    | 45        | 12,8              | <b>340</b>      | 360 | 480 | 90  | 3    | 447,1          | 9,5            | 17,7           | 7  | 21 |
| <b>23072-K-MB</b>     | <b>AH3072G</b>    | 107       | 20,4              | <b>340</b>      | 360 | 540 | 134 | 5    | 485,2          | 12,5           | 23,5           | 9  | 30 |
| <b>24072-B-K30-MB</b> | <b>AH24072</b>    | 147       | 22,3              | <b>340</b>      | 360 | 540 | 180 | 5    | 478,5          | 9,5            | 17,7           | 20 | 26 |
| <b>23172-K-MB</b>     | <b>AH3172G</b>    | 217       | 29,9              | <b>340</b>      | 360 | 600 | 192 | 5    | 520            | 12,5           | 23,5           | 9  | 35 |
| <b>24172-B-K30</b>    | <b>AH24172</b>    | 275       | 29,7              | <b>340</b>      | 360 | 600 | 243 | 5    | 503,6          | 9,5            | 17,7           | 20 | 26 |
| <b>23272-B-K-MB</b>   | <b>AH3272G</b>    | 328       | 37,5              | <b>340</b>      | 360 | 650 | 232 | 6    | 548,3          | 12,5           | 23,5           | 9  | 40 |
| <b>22372-K-MB</b>     | <b>AH3272G</b>    | 625       | 37,5              | <b>340</b>      | 360 | 750 | 224 | 7,5  | 634,9          | 12,5           | 23,5           | 9  | 40 |
| <b>23976-K-MB</b>     | <b>AH3976G</b>    | 66,3      | 16                | <b>360</b>      | 380 | 520 | 106 | 4    | 477,6          | 9,5            | 17,7           | 8  | 22 |
| <b>23076-B-K-MB</b>   | <b>AH3076G</b>    | 115       | 22,1              | <b>360</b>      | 380 | 560 | 135 | 5    | 505,6          | 12,5           | 23,5           | 10 | 31 |
| <b>24076-B-K30-MB</b> | <b>AH24076</b>    | 155       | 24                | <b>360</b>      | 380 | 560 | 180 | 5    | 499            | 9,5            | 17,7           | 20 | 28 |
| <b>23176-K-MB</b>     | <b>AH3176G</b>    | 226       | 32                | <b>360</b>      | 380 | 620 | 194 | 5    | 539,6          | 12,5           | 23,5           | 10 | 36 |
| <b>24176-B-K30</b>    | <b>AH24176</b>    | 277       | 31,8              | <b>360</b>      | 380 | 620 | 243 | 5    | 525,8          | 9,5            | 17,7           | 20 | 28 |
| <b>22276-K-MB</b>     | <b>AH3176</b>     | 284       | 32                | <b>360</b>      | 380 | 680 | 175 | 6    | 592,6          | 12,5           | 23,5           | 10 | 36 |
| <b>23276-B-K-MB</b>   | <b>AH3276G</b>    | 367       | 41,5              | <b>360</b>      | 380 | 680 | 240 | 6    | 576,4          | 12,5           | 23,5           | 10 | 42 |
| <b>23980-B-K-MB</b>   | <b>AH3980G</b>    | 68,2      | 16,9              | <b>380</b>      | 400 | 540 | 106 | 4    | 499            | 9,5            | 17,7           | 8  | 22 |
| <b>23080-K-MB</b>     | <b>AH3080G</b>    | 143       | 25,4              | <b>380</b>      | 400 | 600 | 148 | 5    | 540,5          | 12,5           | 23,5           | 10 | 33 |
| <b>24080-B-K30-MB</b> | <b>AH24080</b>    | 196       | 27,8              | <b>380</b>      | 400 | 600 | 200 | 5    | 530,9          | 12,5           | 23,5           | 20 | 28 |
| <b>23180-B-K-MB</b>   | <b>AH3180G</b>    | 261       | 35,1              | <b>380</b>      | 400 | 650 | 200 | 6    | 567,2          | 12,5           | 23,5           | 10 | 38 |
| <b>24180-B-K30</b>    | <b>AH24180</b>    | 312       | 34,4              | <b>380</b>      | 400 | 650 | 250 | 6    | 553,5          | 12,5           | 23,5           | 20 | 28 |
| <b>22280-K-MB</b>     | <b>AH3180</b>     | 414       | 35,1              | <b>380</b>      | 400 | 720 | 185 | 6    | 629,3          | 12,5           | 23,5           | 10 | 38 |
| <b>23280-B-K-MB</b>   | <b>AH3280G</b>    | 442       | 47,4              | <b>380</b>      | 400 | 720 | 256 | 6    | 609,8          | 12,5           | 23,5           | 10 | 44 |
| <b>22380-K-MB</b>     | <b>AH3280G</b>    | 800       | 47,4              | <b>380</b>      | 400 | 820 | 243 | 7,5  | 694,4          | 12,5           | 23,5           | 10 | 44 |
| <b>23984-K-MB</b>     | <b>AH3984G</b>    | 78        | 17,8              | <b>400</b>      | 420 | 560 | 106 | 4    | 519,5          | 9,5            | 17,7           | 8  | 22 |
| <b>23084-B-K-MB</b>   | <b>AH3084G</b>    | 155       | 27,2              | <b>400</b>      | 420 | 620 | 150 | 5    | 560,7          | 12,5           | 23,5           | 10 | 34 |
| <b>24084-B-K30-MB</b> | <b>AH24084</b>    | 214       | 29,6              | <b>400</b>      | 420 | 620 | 200 | 5    | 550,2          | 12,5           | 23,5           | 22 | 30 |
| <b>23184-K-MB</b>     | <b>AH3184G</b>    | 339       | 42                | <b>400</b>      | 420 | 700 | 224 | 6    | 605,4          | 12,5           | 23,5           | 10 | 40 |
| <b>24184-B-K30</b>    | <b>AH24184</b>    | 407       | 41                | <b>400</b>      | 420 | 700 | 280 | 6    | 590,3          | 12,5           | 23,5           | 22 | 30 |
| <b>22284-K-MB</b>     | <b>AH3184</b>     | 404       | 42                | <b>400</b>      | 420 | 760 | 195 | 7,5  | 661,8          | 12,5           | 23,5           | 10 | 40 |
| <b>23284-B-K-MB</b>   | <b>AH3284G</b>    | 539       | 54                | <b>400</b>      | 420 | 760 | 272 | 7,5  | 642,2          | 12,5           | 23,5           | 10 | 46 |
| <b>23988-K-MB</b>     | <b>AH3988</b>     | 98,3      | 21,2              | <b>420</b>      | 440 | 600 | 118 | 4    | 552,8          | 12,5           | 23,5           | 8  | 25 |
| <b>23088-K-MB</b>     | <b>AHX3088G</b>   | 177       | 30,1              | <b>420</b>      | 440 | 650 | 157 | 6    | 586,8          | 12,5           | 23,5           | 11 | 35 |
| <b>24088-B-K30-MB</b> | <b>AH24088</b>    | 247       | 32,8              | <b>420</b>      | 440 | 650 | 212 | 6    | 575,6          | 12,5           | 23,5           | 22 | 30 |
| <b>23188-K-MB</b>     | <b>AHX3188G</b>   | 378       | 45,3              | <b>420</b>      | 440 | 720 | 226 | 6    | 626            | 12,5           | 23,5           | 11 | 42 |
| <b>24188-B-K30</b>    | <b>AH24188</b>    | 451       | 42,9              | <b>420</b>      | 440 | 720 | 280 | 6    | 612,4          | 12,5           | 23,5           | 22 | 30 |
| <b>22288-K-MB</b>     | <b>AHX3188-H</b>  | 440       | 49,7              | <b>420</b>      | 440 | 790 | 200 | 7,5  | 689,5          | 12,5           | 23,5           | 11 | 42 |
| <b>23288-B-K-MB</b>   | <b>AHX3288G</b>   | 586       | 58,8              | <b>420</b>      | 440 | 790 | 280 | 7,5  | 669,3          | 12,5           | 23,5           | 11 | 48 |

|                                |        | Mounting dimensions    |                        |                        | Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    | Limiting speed                      | Reference speed                     |
|--------------------------------|--------|------------------------|------------------------|------------------------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|-------------------------------------|-------------------------------------|
| Thread<br>d <sub>2G</sub><br>≈ | l<br>≈ | d <sub>a</sub><br>min. | D <sub>a</sub><br>max. | r <sub>a</sub><br>max. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN | n <sub>G</sub><br>min <sup>-1</sup> | n <sub>B</sub><br>min <sup>-1</sup> |
| Tr380X5                        | 112    | 372,4                  | 467,6                  | 2,5                    | 1 430                        | 3 200                          | 0,17                | 4,05           | 6,04           | 3,96           | 209                   | 1 000                               | 800                                 |
| Tr380X5                        | 167    | 378                    | 522                    | 4                      | 2 450                        | 4 800                          | 0,25                | 2,74           | 4,08           | 2,68           | 295                   | 950                                 | 790                                 |
| Tr380X5                        | 206    | 378                    | 522                    | 4                      | 3 250                        | 6 800                          | 0,33                | 2,06           | 3,06           | 2,01           | 530                   | 800                                 | 560                                 |
| Tr380X5                        | 229    | 380                    | 580                    | 4                      | 3 800                        | 7 350                          | 0,33                | 2,06           | 3,06           | 2,01           | 360                   | 850                                 | 550                                 |
| Tr380X5                        | 269    | 380                    | 580                    | 4                      | 4 500                        | 9 000                          | 0,41                | 1,63           | 2,43           | 1,6            | 550                   | 750                                 | 355                                 |
| Tr380X5                        | 274    | 386                    | 624                    | 5                      | 4 900                        | 9 150                          | 0,38                | 1,78           | 2,65           | 1,74           | 720                   | 800                                 | 425                                 |
| Tr380X5                        | 274    | 392                    | 718                    | 6                      | 5 600                        | 8 800                          | 0,33                | 2,06           | 3,06           | 2,01           | 650                   | 700                                 | 480                                 |
| Tr400X5                        | 130    | 394,6                  | 505,4                  | 3                      | 1 760                        | 4 000                          | 0,19                | 3,58           | 5,33           | 3,5            | 265                   | 950                                 | 750                                 |
| Tr400X5                        | 170    | 398                    | 542                    | 4                      | 2 550                        | 5 300                          | 0,24                | 2,84           | 4,23           | 2,78           | 430                   | 900                                 | 730                                 |
| Tr400X5                        | 208    | 398                    | 542                    | 4                      | 3 350                        | 7 200                          | 0,31                | 2,15           | 3,2            | 2,1            | 580                   | 750                                 | 520                                 |
| Tr400X5                        | 232    | 400                    | 600                    | 4                      | 4 050                        | 8 150                          | 0,32                | 2,12           | 3,15           | 2,07           | 385                   | 800                                 | 510                                 |
| Tr400X5                        | 271    | 400                    | 600                    | 4                      | 4 650                        | 9 500                          | 0,39                | 1,71           | 2,54           | 1,67           | 770                   | 700                                 | 330                                 |
| Tr400X5                        | 232    | 406                    | 654                    | 5                      | 4 150                        | 7 100                          | 0,27                | 2,51           | 3,74           | 2,45           | 550                   | 750                                 | 630                                 |
| Tr400X5                        | 284    | 406                    | 654                    | 5                      | 5 300                        | 9 800                          | 0,37                | 1,8            | 2,69           | 1,76           | 780                   | 750                                 | 395                                 |
| Tr420X5                        | 130    | 414,6                  | 525,4                  | 3                      | 1 830                        | 4 150                          | 0,18                | 3,71           | 5,52           | 3,63           | 275                   | 900                                 | 710                                 |
| Tr420X5                        | 183    | 418                    | 582                    | 4                      | 3 050                        | 6 200                          | 0,24                | 2,79           | 4,15           | 2,73           | 365                   | 800                                 | 670                                 |
| Tr420X5                        | 228    | 418                    | 582                    | 4                      | 3 900                        | 8 500                          | 0,33                | 2,06           | 3,06           | 2,01           | 670                   | 700                                 | 485                                 |
| Tr420X5                        | 240    | 426                    | 624                    | 5                      | 4 250                        | 8 500                          | 0,31                | 2,15           | 3,2            | 2,1            | 670                   | 750                                 | 485                                 |
| Tr420X5                        | 278    | 426                    | 624                    | 5                      | 5 100                        | 10 400                         | 0,39                | 1,72           | 2,56           | 1,68           | 720                   | 670                                 | 310                                 |
| Tr420X5                        | 240    | 426                    | 694                    | 5                      | 4 650                        | 7 800                          | 0,26                | 2,55           | 3,8            | 2,5            | 600                   | 700                                 | 600                                 |
| Tr420X5                        | 302    | 426                    | 694                    | 5                      | 5 700                        | 10 800                         | 0,38                | 1,78           | 2,65           | 1,74           | 820                   | 700                                 | 370                                 |
| Tr420X5                        | 302    | 432                    | 788                    | 6                      | 6 550                        | 10 600                         | 0,33                | 2,07           | 3,09           | 2,03           | 610                   | 670                                 | 400                                 |
| Tr440X5                        | 130    | 434,6                  | 545,4                  | 3                      | 1 900                        | 4 500                          | 0,18                | 3,85           | 5,73           | 3,76           | 300                   | 850                                 | 660                                 |
| Tr440X5                        | 186    | 438                    | 602                    | 4                      | 3 150                        | 6 550                          | 0,24                | 2,84           | 4,23           | 2,78           | 395                   | 800                                 | 640                                 |
| Tr440X5                        | 230    | 438                    | 602                    | 4                      | 4 000                        | 8 800                          | 0,32                | 2,13           | 3,17           | 2,08           | 710                   | 670                                 | 460                                 |
| Tr440X5                        | 266    | 446                    | 674                    | 5                      | 5 000                        | 9 650                          | 0,33                | 2,03           | 3,02           | 1,98           | 465                   | 700                                 | 455                                 |
| Tr440X5                        | 310    | 446                    | 674                    | 5                      | 6 200                        | 12 700                         | 0,4                 | 1,67           | 2,49           | 1,63           | 980                   | 630                                 | 265                                 |
| Tr440X5                        | 266    | 452                    | 728                    | 6                      | 5 100                        | 8 650                          | 0,27                | 2,51           | 3,74           | 2,45           | 630                   | 670                                 | 500                                 |
| Tr440X5                        | 321    | 452                    | 728                    | 6                      | 6 550                        | 12 200                         | 0,38                | 1,77           | 2,64           | 1,73           | 930                   | 670                                 | 340                                 |
| Tr460X5                        | 145    | 454,6                  | 585,4                  | 3                      | 2 240                        | 5 200                          | 0,18                | 3,66           | 5,46           | 3,58           | 295                   | 800                                 | 620                                 |
| Tr460X5                        | 194    | 463                    | 627                    | 5                      | 3 400                        | 7 100                          | 0,24                | 2,84           | 4,23           | 2,78           | 405                   | 750                                 | 610                                 |
| Tr460X5                        | 242    | 463                    | 627                    | 5                      | 4 300                        | 9 650                          | 0,32                | 2,12           | 3,15           | 2,07           | 750                   | 630                                 | 430                                 |
| Tr460X5                        | 270    | 466                    | 694                    | 5                      | 5 200                        | 10 400                         | 0,32                | 2,1            | 3,13           | 2,06           | 485                   | 700                                 | 425                                 |
| Tr460X5                        | 310    | 466                    | 694                    | 5                      | 6 400                        | 13 200                         | 0,38                | 1,76           | 2,62           | 1,72           | 1 020                 | 600                                 | 255                                 |
| Tr480X5                        | 270    | 472                    | 758                    | 6                      | 5 400                        | 9 300                          | 0,27                | 2,51           | 3,74           | 2,45           | 680                   | 630                                 | 530                                 |
| Tr480X5                        | 330    | 472                    | 758                    | 6                      | 7 100                        | 13 400                         | 0,37                | 1,8            | 2,69           | 1,76           | 990                   | 630                                 | 320                                 |



# Spherical roller bearings

With withdrawal sleeve



Mounting dimensions

Dimension table (continued) · Dimensions in mm

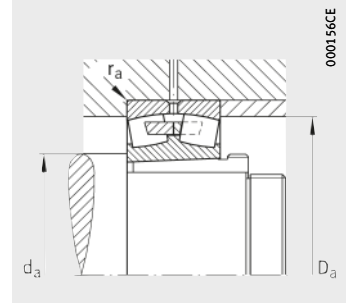
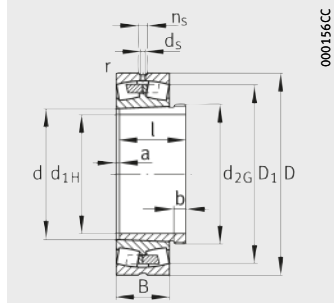
| Designation      |                   | Mass<br>m |                   | Dimensions |     |       |     |      |       |       |       |     |     |
|------------------|-------------------|-----------|-------------------|------------|-----|-------|-----|------|-------|-------|-------|-----|-----|
| Bearing          | Withdrawal sleeve | Bearing   | Withdrawal sleeve | $d_{1H}$   | $d$ | $D$   | $B$ | $r$  | $D_1$ | $d_s$ | $n_s$ | $a$ | $b$ |
|                  |                   | ≈kg       | ≈kg               |            |     |       |     | min. | ≈     |       | ≈     |     |     |
| 23992-B-K-MB     | AH3992            | 103       | 22,2              | 440        | 460 | 620   | 118 | 4    | 573,3 | 12,5  | 23,5  | 8   | 25  |
| 23092-B-K-MB     | AHX3092G          | 212       | 33,1              | 440        | 460 | 680   | 163 | 6    | 612,2 | 12,5  | 23,5  | 11  | 37  |
| 24092-B-K30-MB   | AH24092           | 359       | 35,6              | 440        | 460 | 680   | 218 | 6    | 603,3 | 12,5  | 23,5  | 23  | 32  |
| 23192-K-MB       | AHX3192G          | 420       | 50,8              | 440        | 460 | 760   | 240 | 7,5  | 661,4 | 12,5  | 23,5  | 11  | 43  |
| 24192-B-K30-MB   | AH24192           | 578       | 48,7              | 440        | 460 | 760   | 300 | 7,5  | 642,8 | 12,5  | 23,5  | 23  | 32  |
| 23292-K-MB       | AHX3292G          | 699       | 66,2              | 440        | 460 | 830   | 296 | 7,5  | 701,6 | 12,5  | 23,5  | 11  | 50  |
| 23996-B-K-MB     | AH3996            | 121       | 25,7              | 460        | 480 | 650   | 128 | 5    | 598,8 | 12,5  | 23,5  | 9   | 28  |
| 23096-K-MB       | AHX3096G          | 208       | 35,2              | 460        | 480 | 700   | 165 | 6    | 632,6 | 12,5  | 23,5  | 12  | 38  |
| 24096-B-K30-MB   | AH24096           | 289       | 37,2              | 460        | 480 | 700   | 218 | 6    | 625,4 | 12,5  | 23,5  | 23  | 32  |
| 23196-K-MB       | AHX3196G          | 470       | 55,5              | 460        | 480 | 790   | 248 | 7,5  | 688,3 | 12,5  | 23,5  | 12  | 45  |
| 24196-B-K30-MB   | AH24196           | 628       | 52,2              | 460        | 480 | 790   | 308 | 7,5  | 669,9 | 12,5  | 23,5  | 23  | 32  |
| 23296-K-MB       | AHX3296G          | 806       | 73,3              | 460        | 480 | 870   | 310 | 7,5  | 734,8 | 12,5  | 23,5  | 12  | 52  |
| 239/500-K-MB     | AH39/500          | 124       | 29,6              | 480        | 500 | 670   | 128 | 5    | 619,3 | 12,5  | 23,5  | 10  | 32  |
| 230/500-B-K-MB   | AHX30/500G        | 219       | 40                | 480        | 500 | 720   | 167 | 6    | 653,5 | 12,5  | 23,5  | 12  | 40  |
| 240/500-B-K30-MB | AH240/500         | 384       | 41,7              | 480        | 500 | 720   | 218 | 6    | 645,8 | 12,5  | 23,5  | 23  | 35  |
| 231/500-B-K-MB   | AHX31/500         | 556       | 65,3              | 480        | 500 | 830   | 264 | 7,5  | 720,9 | 12,5  | 23,5  | 12  | 47  |
| 241/500-B-K30-MB | AH241/500         | 738       | 60,5              | 480        | 500 | 830   | 325 | 7,5  | 701,8 | 12,5  | 23,5  | 23  | 35  |
| 232/500-K-MB     | AHX32/500G        | 984       | 88,1              | 480        | 500 | 920   | 336 | 7,5  | 773,8 | 12,5  | 23,5  | 12  | 54  |
| 239/530-K-MB     | AH39/530          | 146       | 45,3              | 500        | 530 | 710   | 136 | 5    | 656,5 | 12,5  | 23,5  | 10  | 37  |
| 230/530-K-MB     | AH30/530A         | 291       | 61,7              | 500        | 530 | 780   | 185 | 6    | 703,7 | 12,5  | 23,5  | 12  | 45  |
| 240/530-B-K30-MB | AH240/530         | 418       | 67,5              | 500        | 530 | 780   | 250 | 6    | 691,9 | 12,5  | 23,5  | 24  | 35  |
| 231/530-K-MB     | AH31/530A         | 643       | 92,3              | 500        | 530 | 870   | 272 | 7,5  | 756,3 | 12,5  | 23,5  | 12  | 53  |
| 241/530-B-K30-MB | AH241/530         | 845       | 89                | 500        | 530 | 870   | 335 | 7,5  | 739,1 | 12,5  | 23,5  | 24  | 35  |
| 232/530-K-MB     | AH32/530AG        | 1 200     | 125               | 500        | 530 | 980   | 355 | 9,5  | 824,4 | 12,5  | 23,5  | 12  | 57  |
| 239/560-B-K-MB   | AH39/560          | 169       | 52,1              | 530        | 560 | 750   | 140 | 5    | 693,4 | 12,5  | 23,5  | 10  | 37  |
| 230/560-B-K-MB   | AH30/560A         | 339       | 71,8              | 530        | 560 | 820   | 195 | 6    | 741,5 | 12,5  | 23,5  | 12  | 45  |
| 240/560-B-K30-MB | AH240/560         | 458       | 77,5              | 530        | 560 | 820   | 258 | 6    | 731,2 | 12,5  | 23,5  | 24  | 38  |
| 231/560-K-MB     | AH31/560A         | 737       | 106               | 530        | 560 | 920   | 280 | 7,5  | 800,2 | 12,5  | 23,5  | 12  | 55  |
| 241/560-B-K30-MB | AH241/560         | 974       | 104               | 530        | 560 | 920   | 355 | 7,5  | 785   | 12,5  | 23,5  | 24  | 38  |
| 232/560-K-MB     | AH32/560AG        | 1 360     | 140               | 530        | 560 | 1 030 | 365 | 9,5  | 868,1 | 12,5  | 23,5  | 12  | 57  |
| 239/600-B-K-MB   | AH39/600          | 210       | 57                | 570        | 600 | 800   | 150 | 5    | 740,5 | 12,5  | 23,5  | 10  | 38  |
| 230/600-B-K-MB   | AH30/600A         | 388       | 75                | 570        | 600 | 870   | 200 | 6    | 791,9 | 12,5  | 23,5  | 14  | 45  |
| 240/600-B-K30-MB | AH240/600         | 544       | 84,1              | 570        | 600 | 870   | 272 | 6    | 773,3 | 12,5  | 23,5  | 26  | 38  |
| 231/600-K-MB     | AH31/600A         | 901       | 116               | 570        | 600 | 980   | 300 | 7,5  | 852,6 | 12,5  | 23,5  | 14  | 55  |
| 241/600-B-K30-MB | AH241/600         | 1 170     | 114               | 570        | 600 | 980   | 375 | 7,5  | 833   | 12,5  | 23,5  | 26  | 38  |
| 232/600-B-K-MB   | AH32/600AG        | 1 560     | 157               | 570        | 600 | 1 090 | 388 | 9,5  | 919,5 | 12,5  | 23,5  | 14  | 57  |

|                                |        | Mounting dimensions    |                        |                        | Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    | Limiting speed                      | Reference speed                     |
|--------------------------------|--------|------------------------|------------------------|------------------------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|-------------------------------------|-------------------------------------|
| Thread<br>d <sub>2G</sub><br>≈ | l<br>≈ | d <sub>a</sub><br>min. | D <sub>a</sub><br>max. | r <sub>a</sub><br>max. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN | n <sub>G</sub><br>min <sup>-1</sup> | n <sub>B</sub><br>min <sup>-1</sup> |
| Tr480X5                        | 145    | 474,6                  | 605,4                  | 3                      | 2 280                        | 5 400                          | 0,18                | 3,85           | 5,73           | 3,76           | 370                   | 750                                 | 590                                 |
| Tr480X5                        | 202    | 483                    | 657                    | 5                      | 3 650                        | 7 650                          | 0,24                | 2,84           | 4,23           | 2,78           | 440                   | 700                                 | 580                                 |
| Tr480X5                        | 250    | 483                    | 657                    | 5                      | 4 750                        | 10 600                         | 0,31                | 2,16           | 3,22           | 2,12           | 710                   | 630                                 | 400                                 |
| Tr480X5                        | 285    | 492                    | 728                    | 6                      | 5 850                        | 11 600                         | 0,32                | 2,12           | 3,15           | 2,07           | 530                   | 630                                 | 390                                 |
| Tr480X5                        | 332    | 492                    | 728                    | 6                      | 7 500                        | 15 600                         | 0,39                | 1,73           | 2,58           | 1,69           | 1 160                 | 560                                 | 227                                 |
| Tr480X5                        | 349    | 492                    | 798                    | 6                      | 7 800                        | 15 000                         | 0,37                | 1,8            | 2,69           | 1,76           | 620                   | 600                                 | 295                                 |
| Tr500X5                        | 158    | 498                    | 632                    | 4                      | 2 550                        | 6 000                          | 0,18                | 3,76           | 5,59           | 3,67           | 460                   | 700                                 | 570                                 |
| Tr500X5                        | 205    | 503                    | 677                    | 5                      | 3 800                        | 8 150                          | 0,23                | 2,9            | 4,31           | 2,83           | 455                   | 670                                 | 550                                 |
| Tr500X5                        | 250    | 503                    | 677                    | 5                      | 4 900                        | 11 200                         | 0,3                 | 2,25           | 3,34           | 2,2            | 830                   | 600                                 | 380                                 |
| Tr500X5                        | 295    | 512                    | 758                    | 6                      | 6 300                        | 12 700                         | 0,32                | 2,12           | 3,15           | 2,07           | 570                   | 630                                 | 370                                 |
| Tr500X5                        | 340    | 512                    | 758                    | 6                      | 8 000                        | 16 600                         | 0,39                | 1,75           | 2,61           | 1,71           | 1 190                 | 560                                 | 213                                 |
| Tr500X5                        | 364    | 512                    | 838                    | 6                      | 8 800                        | 17 000                         | 0,37                | 1,83           | 2,72           | 1,79           | 700                   | 600                                 | 265                                 |
| Tr530X6                        | 162    | 518                    | 652                    | 4                      | 2 600                        | 6 300                          | 0,17                | 3,9            | 5,81           | 3,81           | 400                   | 670                                 | 540                                 |
| Tr530X6                        | 209    | 523                    | 697                    | 5                      | 3 900                        | 8 500                          | 0,22                | 3,01           | 4,48           | 2,94           | 510                   | 670                                 | 520                                 |
| Tr530X6                        | 253    | 523                    | 697                    | 5                      | 4 900                        | 11 200                         | 0,29                | 2,32           | 3,45           | 2,26           | 850                   | 560                                 | 360                                 |
| Tr530X6                        | 313    | 532                    | 798                    | 6                      | 7 100                        | 14 300                         | 0,32                | 2,1            | 3,13           | 2,06           | 990                   | 600                                 | 340                                 |
| Tr530X6                        | 360    | 532                    | 798                    | 6                      | 8 650                        | 18 300                         | 0,39                | 1,73           | 2,58           | 1,69           | 1 340                 | 530                                 | 199                                 |
| Tr530X6                        | 393    | 532                    | 888                    | 6                      | 9 650                        | 18 300                         | 0,38                | 1,78           | 2,65           | 1,74           | 750                   | 560                                 | 260                                 |
| Tr560X6                        | 175    | 548                    | 692                    | 4                      | 2 850                        | 6 800                          | 0,18                | 3,85           | 5,73           | 3,76           | 385                   | 630                                 | 500                                 |
| Tr560X6                        | 230    | 553                    | 757                    | 5                      | 4 400                        | 9 500                          | 0,22                | 3,04           | 4,53           | 2,97           | 540                   | 600                                 | 490                                 |
| Tr560X6                        | 285    | 553                    | 757                    | 5                      | 6 000                        | 13 700                         | 0,31                | 2,15           | 3,2            | 2,1            | 910                   | 530                                 | 340                                 |
| Tr560X6                        | 325    | 562                    | 838                    | 6                      | 7 350                        | 15 300                         | 0,32                | 2,12           | 3,15           | 2,07           | 670                   | 560                                 | 325                                 |
| Tr560X6                        | 370    | 562                    | 838                    | 6                      | 9 500                        | 20 000                         | 0,38                | 1,77           | 2,64           | 1,73           | 1 450                 | 500                                 | 184                                 |
| Tr580X6                        | 412    | 570                    | 940                    | 8                      | 10 800                       | 20 800                         | 0,38                | 1,77           | 2,64           | 1,73           | 1 200                 | 530                                 | 240                                 |
| Tr600X6                        | 180    | 578                    | 732                    | 4                      | 3 100                        | 7 650                          | 0,17                | 3,95           | 5,88           | 3,86           | 570                   | 600                                 | 465                                 |
| Tr600X6                        | 240    | 583                    | 797                    | 5                      | 5 100                        | 11 000                         | 0,23                | 2,95           | 4,4            | 2,89           | 740                   | 560                                 | 450                                 |
| Tr600X6                        | 296    | 583                    | 797                    | 5                      | 6 400                        | 14 600                         | 0,31                | 2,2            | 3,27           | 2,15           | 1 050                 | 500                                 | 320                                 |
| Tr600X6                        | 335    | 592                    | 888                    | 6                      | 8 150                        | 16 600                         | 0,31                | 2,21           | 3,29           | 2,16           | 750                   | 530                                 | 300                                 |
| Tr600X6                        | 393    | 592                    | 888                    | 6                      | 10 600                       | 22 400                         | 0,38                | 1,77           | 2,64           | 1,73           | 1 600                 | 480                                 | 167                                 |
| Tr600X6                        | 422    | 600                    | 990                    | 8                      | 11 600                       | 22 400                         | 0,38                | 1,78           | 2,65           | 1,74           | 910                   | 500                                 | 220                                 |
| Tr630X6                        | 192    | 618                    | 782                    | 4                      | 3 450                        | 8 650                          | 0,17                | 3,95           | 5,88           | 3,86           | 630                   | 560                                 | 430                                 |
| Tr630X6                        | 245    | 623                    | 847                    | 5                      | 5 700                        | 12 500                         | 0,22                | 3,07           | 4,57           | 3              | 890                   | 530                                 | 405                                 |
| Tr630X6                        | 310    | 623                    | 847                    | 5                      | 7 100                        | 16 600                         | 0,31                | 2,21           | 3,29           | 2,16           | 1 200                 | 630                                 | 285                                 |
| Tr630X6                        | 355    | 632                    | 948                    | 6                      | 9 000                        | 19 300                         | 0,31                | 2,2            | 3,27           | 2,15           | 810                   | 500                                 | 270                                 |
| Tr630X6                        | 413    | 632                    | 948                    | 6                      | 11 600                       | 26 000                         | 0,38                | 1,79           | 2,67           | 1,75           | 1 780                 | 450                                 | 149                                 |
| Tr630X6                        | 445    | 640                    | 1 050                  | 8                      | 12 900                       | 25 500                         | 0,37                | 1,83           | 2,72           | 1,79           | 1 740                 | 480                                 | 190                                 |



# Spherical roller bearings

With withdrawal sleeve

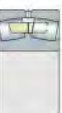


Mounting dimensions

Dimension table (continued) · Dimensions in mm

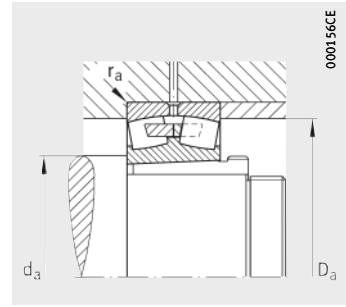
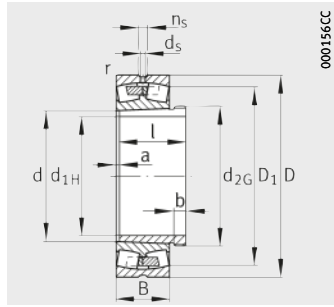
| Designation      |                   | Mass<br>m |                        | Dimensions      |     |      |     |      |                |                |                |    |    |
|------------------|-------------------|-----------|------------------------|-----------------|-----|------|-----|------|----------------|----------------|----------------|----|----|
| Bearing          | Withdrawal sleeve | Bearing   | With-<br>drawal sleeve | d <sub>1H</sub> | d   | D    | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | a  | b  |
|                  |                   | ≈kg       | ≈kg                    |                 |     |      |     | min. | ≈              |                |                | ≈  |    |
| 239/630-B-K-MB   | AH39/630          | 283       | 69,4                   | 600             | 630 | 850  | 165 | 6    | 784,5          | 12,5           | 23,5           | 12 | 40 |
| 230/630-B-K-MB   | AH30/630A         | 480       | 87,3                   | 600             | 630 | 920  | 212 | 7,5  | 834,3          | 12,5           | 23,5           | 14 | 46 |
| 240/630-B-K30-MB | AH240/630         | 649       | 97,9                   | 600             | 630 | 920  | 290 | 7,5  | 817,9          | 12,5           | 23,5           | 26 | 40 |
| 231/630-B-K-MB   | AH31/630A         | 1040      | 136                    | 600             | 630 | 1030 | 315 | 7,5  | 896,2          | 12,5           | 23,5           | 14 | 60 |
| 241/630-B-K30-MB | AH241/630         | 1360      | 133                    | 600             | 630 | 1030 | 400 | 7,5  | 872,2          | 12,5           | 23,5           | 26 | 40 |
| 232/630-B-K-MB   | AH32/630AG        | 1885      | 185                    | 600             | 630 | 1150 | 412 | 12   | 969,2          | 12,5           | 23,5           | 14 | 63 |
| 239/670-B-K-MB   | AH39/670          | 310       | 92,9                   | 630             | 670 | 900  | 170 | 6    | 831,5          | 12,5           | 23,5           | 12 | 41 |
| 230/670-B-K-MB   | AH30/670A         | 590       | 124                    | 630             | 670 | 980  | 230 | 7,5  | 888,7          | 12,5           | 23,5           | 14 | 50 |
| 240/670-B-K30-MB | AH240/670G        | 813       | 138                    | 630             | 670 | 980  | 308 | 7,5  | 873,1          | 12,5           | 23,5           | 26 | 40 |
| 231/670-B-K-MB   | AH31/670A         | 1650      | 185                    | 630             | 670 | 1090 | 336 | 7,5  | 948,2          | 12,5           | 23,5           | 14 | 60 |
| 241/670-B-K30-MB | AH241/670         | 1540      | 180                    | 630             | 670 | 1090 | 412 | 7,5  | 929,4          | 12,5           | 23,5           | 26 | 40 |
| 232/670-B-K-MB   | AH32/670AG        | 2240      | 249                    | 630             | 670 | 1220 | 438 | 12   | 1030,5         | 12,5           | 23,5           | 14 | 62 |
| 239/710-K-MB     | AH39/710          | 336       | 105                    | 670             | 710 | 950  | 180 | 6    | 877,5          | 12,5           | 23,5           | 12 | 43 |
| 230/710-B-K-MB   | AH30/710A         | 650       | 135                    | 670             | 710 | 1030 | 236 | 7,5  | 938,8          | 12,5           | 23,5           | 16 | 50 |
| 240/710-B-K30-MB | AH240/710         | 873       | 152                    | 670             | 710 | 1030 | 315 | 7,5  | 921,6          | 12,5           | 23,5           | 26 | 45 |
| 231/710-B-K-MB   | AH31/710A         | 1420      | 202                    | 670             | 710 | 1150 | 345 | 9,5  | 1006,6         | 12,5           | 23,5           | 16 | 60 |
| 241/710-B-K30-MB | AH241/710         | 1790      | 207                    | 670             | 710 | 1150 | 438 | 9,5  | 980,2          | 12,5           | 23,5           | 26 | 45 |
| 232/710-B-K-MB   | AH32/710AG        | 2550      | 275                    | 670             | 710 | 1280 | 450 | 12   | 1088,4         | 12,5           | 23,5           | 16 | 65 |
| 238/710-K-MB     | AH38/710          | 139       | 58,6                   | 680             | 710 | 870  | 118 | 4    | 824,9          | 8              | 15             | 12 | 43 |
| 239/750-K-MB     | AH39/750          | 394       | 118                    | 710             | 750 | 1000 | 185 | 6    | 923,2          | 12,5           | 23,5           | 12 | 44 |
| 230/750-K-MB     | AH30/750A         | 786       | 155                    | 710             | 750 | 1090 | 250 | 7,5  | 990,9          | 12,5           | 23,5           | 16 | 50 |
| 240/750-B-K30-MB | AH240/750         | 1070      | 174                    | 710             | 750 | 1090 | 335 | 7,5  | 976,2          | 12,5           | 23,5           | 28 | 45 |
| 231/750-B-K-MB   | AH31/750A         | 1670      | 232                    | 710             | 750 | 1220 | 365 | 9,5  | 1067,4         | 12,5           | 23,5           | 16 | 60 |
| 241/750-B-K30-MB | AH241/750G        | 2300      | 244                    | 710             | 750 | 1220 | 475 | 9,5  | 1035,8         | 12,5           | 23,5           | 28 | 45 |
| 232/750-B-K-MB   | AH32/750A         | 3050      | 312                    | 710             | 750 | 1360 | 475 | 15   | 1154,1         | 12,5           | 23,5           | 16 | 65 |
| 239/800-B-K-MB   | AH39/800          | 490       | 155                    | 750             | 800 | 1060 | 195 | 6    | 983,7          | 12,5           | 23,5           | 12 | 45 |
| 230/800-K-MB     | AH30/800A         | 861       | 198                    | 750             | 800 | 1150 | 258 | 7,5  | 1050,9         | 12,5           | 23,5           | 18 | 50 |
| 240/800-B-K30-MB | AH240/800G        | 1190      | 233                    | 750             | 800 | 1150 | 345 | 7,5  | 1034,1         | 12,5           | 23,5           | 28 | 50 |
| 231/800-K-MB     | AH31/800A         | 2400      | 297                    | 750             | 800 | 1280 | 375 | 9,5  | 1119,1         | 12,5           | 23,5           | 18 | 63 |
| 241/800-B-K30-MB | AH241/800G        | 2530      | 313                    | 750             | 800 | 1280 | 475 | 9,5  | 1099,5         | 12,5           | 23,5           | 28 | 50 |
| 239/850-K-MB     | AH39/850          | 554       | 176                    | 800             | 850 | 1120 | 200 | 6    | 1039,9         | 12,5           | 23,5           | 12 | 50 |
| 230/850-B-K-MB   | AH30/850A         | 1060      | 224                    | 800             | 850 | 1220 | 272 | 7,5  | 1113,5         | 12,5           | 23,5           | 18 | 53 |
| 240/850-B-K30-MB | AH240/850         | 1420      | 259                    | 800             | 850 | 1220 | 365 | 7,5  | 1092,9         | 12,5           | 23,5           | 30 | 50 |
| 231/850-B-K-MB   | AH31/850A         | 2340      | 336                    | 800             | 850 | 1360 | 400 | 12   | 1198,1         | 12,5           | 23,5           | 18 | 63 |
| 241/850-B-K30-MB | AH241/850G        | 2840      | 363                    | 800             | 850 | 1360 | 500 | 12   | 1171,7         | 12,5           | 23,5           | 40 | 60 |

|                           |     | Mounting dimensions |                |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------------|-----|---------------------|----------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| Thread<br>d <sub>2G</sub> | l   | d <sub>a</sub>      | D <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈                         | ≈   | min.                | max.           | max.           | kN                     | kN                       |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| Tr655X6                   | 210 | 653                 | 827            | 5              | 4 050                  | 9 800                    | 0,18                | 3,8            | 5,66           | 3,72           | 710                | 530               | 405               |
| Tr670X6                   | 258 | 658                 | 892            | 6              | 6 300                  | 13 700                   | 0,22                | 3,01           | 4,48           | 2,94           | 890                | 500               | 380               |
| Tr670X6                   | 330 | 658                 | 892            | 6              | 8 000                  | 19 000                   | 0,31                | 2,21           | 3,29           | 2,16           | 1 350              | 480               | 260               |
| Tr670X6                   | 375 | 662                 | 998            | 6              | 9 800                  | 20 800                   | 0,31                | 2,21           | 3,29           | 2,16           | 1 430              | 480               | 260               |
| Tr670X6                   | 440 | 662                 | 998            | 6              | 12 900                 | 29 000                   | 0,38                | 1,78           | 2,65           | 1,74           | 1 960              | 450               | 136               |
| Tr670X6                   | 475 | 678                 | 1 102          | 10             | 14 300                 | 28 500                   | 0,37                | 1,8            | 2,69           | 1,76           | 1 370              | 450               | 180               |
| Tr710X7                   | 216 | 693                 | 877            | 5              | 4 300                  | 10 600                   | 0,17                | 3,95           | 5,88           | 3,86           | 750                | 500               | 375               |
| Tr710X7                   | 280 | 698                 | 952            | 6              | 7 200                  | 16 000                   | 0,22                | 3,01           | 4,48           | 2,94           | 1 100              | 480               | 350               |
| Tr710X7                   | 348 | 698                 | 952            | 6              | 9 000                  | 21 600                   | 0,31                | 2,2            | 3,27           | 2,15           | 1 460              | 450               | 240               |
| Tr710X7                   | 395 | 702                 | 1 058          | 6              | 11 000                 | 24 000                   | 0,31                | 2,21           | 3,29           | 2,16           | 1 560              | 450               | 220               |
| Tr710X7                   | 452 | 702                 | 1 058          | 6              | 14 000                 | 31 500                   | 0,37                | 1,83           | 2,72           | 1,79           | 2 110              | 430               | 127               |
| Tr710X7                   | 500 | 718                 | 1 172          | 10             | 16 300                 | 32 500                   | 0,37                | 1,8            | 2,69           | 1,76           | 2 150              | 430               | 160               |
| Tr750X7                   | 228 | 733                 | 927            | 5              | 4 800                  | 12 000                   | 0,18                | 3,85           | 5,73           | 3,76           | 720                | 480               | 350               |
| Tr750X7                   | 286 | 738                 | 1 002          | 6              | 7 650                  | 17 000                   | 0,22                | 3,07           | 4,57           | 3              | 1 140              | 480               | 325               |
| Tr750X7                   | 360 | 738                 | 1 002          | 6              | 9 500                  | 22 800                   | 0,3                 | 2,26           | 3,37           | 2,21           | 1 550              | 430               | 223               |
| Tr750X7                   | 405 | 750                 | 1 110          | 8              | 12 500                 | 27 000                   | 0,3                 | 2,25           | 3,34           | 2,2            | 1 810              | 450               | 200               |
| Tr750X7                   | 483 | 750                 | 1 110          | 8              | 15 600                 | 35 500                   | 0,38                | 1,79           | 2,67           | 1,75           | 2 340              | 400               | 116               |
| Tr750X7                   | 515 | 758                 | 1 232          | 10             | 17 300                 | 35 500                   | 0,37                | 1,83           | 2,72           | 1,79           | 2 300              | 430               | 150               |
| Tr740X7                   | 163 | 724,6               | 855,4          | 3              | 2 600                  | 7 500                    | 0,12                | 5,72           | 8,51           | 5,59           | 540                | 500               | –                 |
| Tr800X7                   | 234 | 773                 | 977            | 5              | 5 200                  | 12 900                   | 0,17                | 3,95           | 5,88           | 3,86           | 790                | 480               | 325               |
| Tr800X7                   | 300 | 778                 | 1 062          | 6              | 8 500                  | 19 000                   | 0,22                | 3,01           | 4,48           | 2,94           | 1 010              | 450               | 305               |
| Tr800X7                   | 380 | 778                 | 1 062          | 6              | 10 800                 | 26 000                   | 0,3                 | 2,26           | 3,37           | 2,21           | 1 730              | 400               | 204               |
| Tr800X7                   | 425 | 790                 | 1 180          | 8              | 14 000                 | 30 500                   | 0,29                | 2,3            | 3,42           | 2,25           | 1 990              | 430               | 190               |
| Tr800X7                   | 520 | 790                 | 1 180          | 8              | 18 000                 | 40 500                   | 0,38                | 1,76           | 2,62           | 1,72           | 2 600              | 300               | 110               |
| Tr800X7                   | 540 | 808                 | 1 302          | 12             | 19 300                 | 40 000                   | 0,37                | 1,83           | 2,72           | 1,79           | 2 550              | 400               | 140               |
| Tr830X7                   | 245 | 823                 | 1 037          | 5              | 5 850                  | 15 000                   | 0,17                | 4,05           | 6,04           | 3,96           | 1 010              | 450               | 295               |
| Tr850X7                   | 308 | 828                 | 1 122          | 6              | 9 300                  | 21 200                   | 0,22                | 3,07           | 4,57           | 3              | 1 430              | 430               | 280               |
| Tr850X7                   | 395 | 828                 | 1 122          | 6              | 11 600                 | 28 500                   | 0,29                | 2,33           | 3,47           | 2,28           | 1 810              | 360               | 190               |
| Tr850X7                   | 438 | 840                 | 1 240          | 8              | 15 000                 | 33 500                   | 0,29                | 2,32           | 3,45           | 2,26           | 1 680              | 400               | 170               |
| Tr850X7                   | 525 | 840                 | 1 240          | 8              | 18 600                 | 44 000                   | 0,36                | 1,86           | 2,77           | 1,82           | 2 430              | 340               | 95                |
| Tr900X7                   | 258 | 873                 | 1 097          | 5              | 6 300                  | 16 300                   | 0,16                | 4,11           | 6,12           | 4,02           | 960                | 430               | 275               |
| Tr900X7                   | 325 | 878                 | 1 192          | 6              | 10 400                 | 23 600                   | 0,22                | 3,07           | 4,57           | 3              | 1 540              | 400               | 260               |
| Tr900X7                   | 415 | 878                 | 1 192          | 6              | 12 900                 | 32 000                   | 0,29                | 2,33           | 3,47           | 2,28           | 2 060              | 480               | 173               |
| Tr900X7                   | 462 | 898                 | 1 312          | 10             | 17 000                 | 38 000                   | 0,29                | 2,32           | 3,45           | 2,26           | 2 410              | 360               | 160               |
| Tr900X7                   | 560 | 898                 | 1 312          | 10             | 21 200                 | 49 000                   | 0,36                | 1,89           | 2,81           | 1,84           | 3 150              | 300               | 90                |



# Spherical roller bearings

With withdrawal sleeve



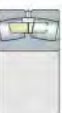
Mounting dimensions

Dimension table (continued) · Dimensions in mm

| Designation       |                   | Mass<br>m |                        | Dimensions      |       |       |     |      |                |                |                |    |    |
|-------------------|-------------------|-----------|------------------------|-----------------|-------|-------|-----|------|----------------|----------------|----------------|----|----|
| Bearing           | Withdrawal sleeve | Bearing   | With-<br>drawal sleeve | d <sub>1H</sub> | d     | D     | B   | r    | D <sub>1</sub> | d <sub>s</sub> | n <sub>s</sub> | a  | b  |
|                   |                   | ≈kg       | ≈kg                    |                 |       |       |     | min. | ≈              |                |                | ≈  |    |
| 239/900-K-MB      | AH39/900          | 641       | 191                    | 850             | 900   | 1 180 | 206 | 6    | 1 098,8        | 12,5           | 23,5           | 12 | 51 |
| 230/900-B-K-MB    | AH30/900A         | 1 280     | 246                    | 850             | 900   | 1 280 | 280 | 7,5  | 1 171,3        | 12,5           | 23,5           | 20 | 55 |
| 240/900-B-K30-MB  | AH240/900G        | 1 570     | 291                    | 850             | 900   | 1 280 | 375 | 7,5  | 1 150,7        | 12,5           | 23,5           | 45 | 55 |
| 231/900-B-K-MB    | AH31/900A         | 2 570     | 368                    | 850             | 900   | 1 420 | 412 | 12   | 1 252,4        | 12,5           | 23,5           | 20 | 63 |
| 241/900-B-K30-MB  | AH241/900G        | 3 040     | 397                    | 850             | 900   | 1 420 | 515 | 12   | 1 230,4        | 12,5           | 23,5           | 45 | 60 |
| 238/900-B-K-MB    | AH38/900          | 274       | 109                    | 860             | 900   | 1 090 | 140 | 5    | 1 036,1        | 8              | 15             | 12 | 51 |
| 239/950-B-K-MB    | AH39/950G-H       | 746       | 216                    | 900             | 950   | 1 250 | 224 | 7,5  | 1 162,5        | 12,5           | 23,5           | 15 | 51 |
| 230/950-B-K-MB    | AH30/950A         | 1 420     | 277                    | 900             | 950   | 1 360 | 300 | 7,5  | 1 244,7        | 12,5           | 23,5           | 20 | 55 |
| 240/950-B-K30-MB  | AH240/950G        | 1 970     | 335                    | 900             | 950   | 1 360 | 412 | 7,5  | 1 216          | 12,5           | 23,5           | 45 | 55 |
| 231/950-B-K-MB    | AH31/950A         | 3 060     | 414                    | 900             | 950   | 1 500 | 438 | 12   | 1 322,5        | 12,5           | 23,5           | 20 | 63 |
| 241/950-B-K30-MB  | AH241/950G        | 3 820     | 443                    | 900             | 950   | 1 500 | 545 | 12   | 1 306,7        | 12,5           | 23,5           | 45 | 60 |
| 239/1000-B-K-MB   | AH39/1000-H       | 898       | 229                    | 950             | 1 000 | 1 320 | 236 | 7,5  | 1 227,4        | 12,5           | 23,5           | 15 | 52 |
| 230/1000-B-K-MB   | AH30/1 000A       | 1 590     | 309                    | 950             | 1 000 | 1 420 | 308 | 7,5  | 1 300,3        | 12,5           | 23,5           | 22 | 57 |
| 240/1000-B-K30-MB | AH240/1000        | 2 070     | 357                    | 950             | 1 000 | 1 420 | 412 | 7,5  | 1 278,3        | 12,5           | 23,5           | 50 | 57 |
| 231/1000-K-MB     | AH31/1 000A       | 4 640     | 471                    | 950             | 1 000 | 1 580 | 462 | 12   | 1 392,5        | 12,5           | 23,5           | 22 | 63 |
| 241/1000-B-K30-MB | AH241/1000        | 4 380     | 502                    | 950             | 1 000 | 1 580 | 580 | 12   | 1 372,6        | 12,5           | 23,5           | 50 | 65 |
| 230/1060-B-K-MB   | AH30/1 060A       | 1 920     | 396                    | 1 000           | 1 060 | 1 500 | 325 | 9,5  | 1 374,4        | 12,5           | 23,5           | 22 | 60 |
| 240/1060-B-K30-MB | AH240/1060        | 2 520     | 465                    | 1 000           | 1 060 | 1 500 | 438 | 9,5  | 1 353,5        | 12,5           | 23,5           | 50 | 60 |
| 241/1060-B-K30-MB | AH241/1060        | 5 000     | 632                    | 1 000           | 1 060 | 1 660 | 600 | 15   | –              | 12,5           | 23,5           | 50 | 65 |
| 248/1060-B-K30-MB | AH248/1060        | 599       | 169                    | 1 020           | 1 060 | 1 280 | 218 | 6    | 1 212,7        | 9,5            | 17,7           | 37 | 52 |
| 230/1120-B-K-MB   | AH30/1 120A       | 2 210     | 451                    | 1 060           | 1 120 | 1 580 | 345 | 9,5  | 1 447,7        | 12,5           | 23,5           | 22 | 65 |
| 240/1120-B-K30-MB | AH240/1120        | 2 920     | 524                    | 1 060           | 1 120 | 1 580 | 462 | 9,5  | 1 429,7        | 12,5           | 23,5           | 50 | 65 |
| 241/1120-B-K30-MB | AH241/1120        | 5 800     | 717                    | 1 060           | 1 120 | 1 750 | 630 | 15   | 1 527,2        | 12,5           | 23,5           | 50 | 75 |
| 239/1120-B-K-MB   | AH39/1120G        | 1 160     | 291                    | 1 070           | 1 120 | 1 460 | 250 | 7,5  | 1 368,1        | 12,5           | 23,5           | 15 | 52 |
| 230/1180-B-K-MB   | AH30/1 180A       | 2 510     | 498                    | 1 120           | 1 180 | 1 660 | 355 | 9,5  | 1 523,4        | 12,5           | 23,5           | 22 | 65 |
| 239/1180-B-K-MB   | AH39/1180G        | 1 340     | 337                    | 1 130           | 1 180 | 1 540 | 272 | 7,5  | 1 438,3        | 12,5           | 23,5           | 15 | 55 |
| 230/1250-B-K-MB   | AH30/1 250A       | 2 920     | 629                    | 1 180           | 1 250 | 1 750 | 375 | 9,5  | 1 607,6        | 12,5           | 23,5           | 22 | 70 |
| 240/1250-B-K30-MB | AH240/1250        | 3 640     | 733                    | 1 180           | 1 250 | 1 750 | 500 | 0    | 1 580,6        | 12,5           | 23,5           | 50 | 70 |
| 239/1250-B-K-MB   | AH39/1250G        | 1 630     | 370                    | 1 200           | 1 250 | 1 630 | 280 | 7,5  | 1 516,1        | 12,5           | 23,5           | 18 | 55 |
| 240/1320-B-K30-MB | AH240/1320        | 4 550     | 828                    | 1 250           | 1 320 | 1 850 | 530 | 12   | 1 667,8        | 12,5           | 23,5           | 50 | 70 |
| 239/1320-B-K-MB   | AH39/1320G        | 1 950     | 425                    | 1 270           | 1 320 | 1 720 | 300 | 7,5  | 1 602,2        | 12,5           | 23,5           | 18 | 55 |
| 240/1400-B-K30-MB | AH240/1400        | 5 170     | 1 030                  | 1 320           | 1 400 | 1 950 | 545 | 12   | 1 766,8        | 12,5           | 23,5           | 50 | 70 |
| 239/1400-B-K-MB   | AH39/1400G        | 2 200     | 504                    | 1 350           | 1 400 | 1 820 | 315 | 9,5  | 1 695,6        | 12,5           | 23,5           | 20 | 60 |
| 238/1500-K-MB     | AH38/1500         | 1 380     | 365                    | 1 450           | 1 500 | 1 820 | 243 | 7    | 1 729,3        | 12,5           | 23,5           | 20 | 60 |
| 239/1500-B-K-MB   | AH39/1500G        | 2 790     | 569                    | 1 450           | 1 500 | 1 950 | 335 | 9,5  | 1 817,2        | 12,5           | 23,5           | 20 | 60 |

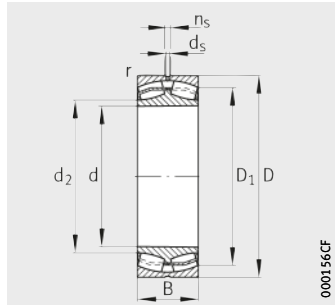


|                           |     | Mounting dimensions |                |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load | Limiting speed    | Reference speed   |
|---------------------------|-----|---------------------|----------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|-------------------|-------------------|
| Thread<br>d <sub>2G</sub> | l   | d <sub>a</sub>      | D <sub>a</sub> | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    | n <sub>G</sub>    | n <sub>B</sub>    |
| ≈                         | ≈   | min.                | max.           | max.           | kN                     | kN                       |                     |                |                |                | kN                 | min <sup>-1</sup> | min <sup>-1</sup> |
| Tr950X8                   | 265 | 923                 | 1 157          | 5              | 6 550                  | 17 300                   | 0,16                | 4,28           | 6,37           | 4,19           | 1 010              | 400               | 260               |
| Tr950X8                   | 335 | 928                 | 1 252          | 6              | 11 000                 | 26 500                   | 0,22                | 3,14           | 4,67           | 3,07           | 1 620              | 400               | 240               |
| Tr950X8                   | 430 | 928                 | 1 252          | 6              | 14 000                 | 36 500                   | 0,28                | 2,45           | 3,64           | 2,39           | 2 190              | 300               | 150               |
| Tr950X8                   | 475 | 948                 | 1 372          | 10             | 18 000                 | 40 500                   | 0,29                | 2,33           | 3,47           | 2,28           | 2 550              | 340               | 150               |
| Tr950X8                   | 575 | 948                 | 1 372          | 10             | 22 400                 | 53 000                   | 0,35                | 1,91           | 2,85           | 1,87           | 2 900              | 280               | 80                |
| Tr930X8                   | 193 | 918                 | 1 072          | 4              | 2 200                  | 5 700                    | 0,11                | 6,06           | 9,02           | 5,92           | 375                | 430               | –                 |
| Tr1000X8                  | 282 | 978                 | 1 222          | 6              | 7 500                  | 20 000                   | 0,16                | 4,22           | 6,29           | 4,13           | 1 280              | 360               | 240               |
| Tr1000X8                  | 355 | 978                 | 1 332          | 6              | 12 200                 | 29 000                   | 0,22                | 3,14           | 4,67           | 3,07           | 1 810              | 340               | 220               |
| Tr1000X8                  | 467 | 978                 | 1 332          | 6              | 16 300                 | 41 500                   | 0,29                | 2,32           | 3,45           | 2,26           | 2 550              | 280               | 140               |
| Tr1000X8                  | 500 | 998                 | 1 452          | 10             | 20 000                 | 45 500                   | 0,29                | 2,33           | 3,47           | 2,28           | 2 210              | 300               | 140               |
| Tr1000X8                  | 605 | 998                 | 1 452          | 10             | 23 600                 | 54 000                   | 0,36                | 1,87           | 2,79           | 1,83           | 1 720              | 260               | 80                |
| Tr1035X8                  | 296 | 1 028               | 1 292          | 6              | 8 150                  | 21 600                   | 0,16                | 4,22           | 6,29           | 4,13           | 1 590              | 340               | 220               |
| Tr1060X8                  | 365 | 1 028               | 1 392          | 6              | 13 200                 | 31 500                   | 0,21                | 3,2            | 4,77           | 3,13           | 1 570              | 340               | 200               |
| Tr1060X8                  | 469 | 1 028               | 1 392          | 6              | 16 600                 | 42 500                   | 0,28                | 2,41           | 3,59           | 2,35           | 2 550              | 260               | 140               |
| Tr1060X8                  | 525 | 1 048               | 1 532          | 10             | 22 000                 | 51 000                   | 0,29                | 2,33           | 3,47           | 2,28           | 3 150              | 280               | 130               |
| Tr1060X8                  | 645 | 1 048               | 1 532          | 10             | 27 500                 | 64 000                   | 0,35                | 1,91           | 2,85           | 1,87           | 4 000              | 260               | 70                |
| Tr1120X8                  | 385 | 1 094               | 1 466          | 8              | 14 300                 | 35 500                   | 0,21                | 3,27           | 4,87           | 3,2            | 1 740              | 280               | 240               |
| Tr1120X8                  | 498 | 1 094               | 1 466          | 8              | 18 600                 | 50 000                   | 0,27                | 2,47           | 3,67           | 2,41           | 2 950              | 260               | 120               |
| Tr1120X8                  | 665 | 1 118               | 1 602          | 12             | 29 000                 | 69 500                   | 0,35                | 1,95           | 2,9            | 1,91           | 4 100              | 260               | 67                |
| Tr1095X8                  | 270 | 1 083               | 1 257          | 5              | 6 950                  | 22 800                   | 0,15                | 4,54           | 6,75           | 4,43           | 1 280              | 280               | –                 |
| Tr1180X8                  | 410 | 1 154               | 1 546          | 8              | 15 000                 | 38 000                   | 0,21                | 3,27           | 4,87           | 3,2            | 2 130              | 260               | 180               |
| Tr1180X8                  | 527 | 1 154               | 1 546          | 8              | 20 800                 | 55 000                   | 0,28                | 2,45           | 3,64           | 2,39           | 3 250              | 260               | 110               |
| Tr1180X8                  | 705 | 1 178               | 1 692          | 12             | 31 000                 | 72 000                   | 0,35                | 1,91           | 2,85           | 1,87           | 3 950              | 240               | 60                |
| Tr1180X8                  | 310 | 1 148               | 1 432          | 6              | 10 200                 | 27 500                   | 0,16                | 4,28           | 6,37           | 4,19           | 1 740              | 280               | 190               |
| Tr1250X8                  | 420 | 1 214               | 1 626          | 8              | 16 600                 | 41 500                   | 0,21                | 3,27           | 4,87           | 3,2            | 2 400              | 260               | 170               |
| Tr1250X8                  | 330 | 1 208               | 1 512          | 6              | 11 400                 | 31 000                   | 0,17                | 4,05           | 6,04           | 3,96           | 1 760              | 260               | 180               |
| Tr1320X8                  | 445 | 1 284               | 1 716          | 8              | 18 000                 | 46 500                   | 0,2                 | 3,34           | 4,98           | 3,27           | 2 700              | 260               | 150               |
| Tr1320X8                  | 570 | 1 284               | 1 716          | 8              | 23 200                 | 62 000                   | 0,25                | 2,69           | 4              | 2,63           | 3 600              | 240               | –                 |
| Tr1320X8                  | 340 | 1 278               | 1 602          | 6              | 12 000                 | 32 500                   | 0,15                | 4,47           | 6,65           | 4,37           | 1 970              | 260               | 160               |
| Tr1400X8                  | 600 | 1 362               | 1 808          | 8              | 26 000                 | 69 500                   | 0,25                | 2,69           | 4              | 2,63           | 4 100              | 260               | 110               |
| Tr1400X8                  | 360 | 1 348               | 1 692          | 6              | 13 700                 | 39 000                   | 0,16                | 4,28           | 6,37           | 4,19           | 2 190              | 260               | 150               |
| Tr1500X8                  | 615 | 1 442               | 1 908          | 10             | 28 000                 | 76 500                   | 0,24                | 2,76           | 4,11           | 2,7            | 4 450              | 220               | 80                |
| Tr1500X8                  | 380 | 1 434               | 1 786          | 8              | 14 600                 | 42 500                   | 0,16                | 4,28           | 6,37           | 4,19           | 2 390              | 240               | 140               |
| Tr1500X8                  | 306 | 1 528               | 1 792          | 6              | 10 000                 | 33 500                   | 0,12                | 5,83           | 8,67           | 5,7            | 1 910              | 220               | –                 |
| Tr1600X8                  | 400 | 1 534               | 1 916          | 8              | 16 300                 | 49 000                   | 0,16                | 4,28           | 6,37           | 4,19           | 2 550              | 220               | 130               |

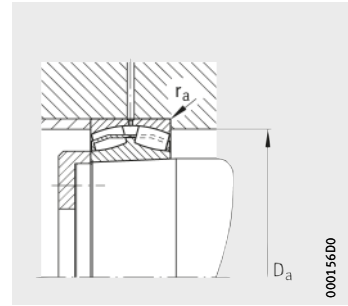


# Special spherical roller bearings

With tapered bore  
For work rolls  
in cold pilger rolling  
machines



Taper 1:30



Mounting dimensions

**Dimension table** - Dimensions in mm

| Designation                 | Mass<br>m<br>≈kg | Dimensions |     |     |      |                |                |                |                |
|-----------------------------|------------------|------------|-----|-----|------|----------------|----------------|----------------|----------------|
|                             |                  | d          | D   | B   | r    | D <sub>1</sub> | d <sub>2</sub> | d <sub>s</sub> | n <sub>s</sub> |
|                             |                  |            |     |     | min. | ≈              | ≈              |                |                |
| <b>Z-518393.24138-A-K30</b> | 41,3             | <b>190</b> | 320 | 128 | 3    | 270            | 215,8          | 6,3            | 12,2           |
| <b>Z-527490.24140-A-K30</b> | 50,4             | <b>200</b> | 340 | 140 | 3    | 285,9          | 225,7          | 6,3            | 12,2           |
| <b>Z-514842.24144-A-K30</b> | 63,6             | <b>220</b> | 370 | 150 | 4    | 311,7          | 247,2          | 6,3            | 12,2           |
| <b>Z-527491.24148-A-K30</b> | 77,6             | <b>240</b> | 400 | 160 | 4    | 338            | –              | 6,3            | 12,2           |
| <b>Z-514242.24152-A-K30</b> | 114              | <b>260</b> | 440 | 180 | 4    | 370,3          | 294,5          | 8              | 15             |
| <b>Z-526655.24160-A-K30</b> | 159              | <b>300</b> | 500 | 200 | 5    | 424,3          | 340,7          | 6,3            | 12,2           |
| <b>Z-523187.24164-A-K30</b> | 197              | <b>320</b> | 540 | 218 | 5    | 456,1          | 362,8          | 9,5            | 17,7           |
| <b>F-801462.24172-A-K30</b> | 269              | <b>360</b> | 600 | 243 | 5    | 503,6          | –              | 9,5            | 17,7           |
| <b>Z-525933.24184-A-K30</b> | 431              | <b>420</b> | 700 | 280 | 6    | 592,1          | 476,4          | 8              | 15             |

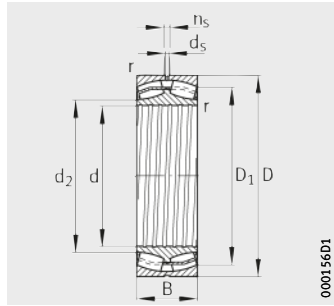
Bearings with reinforced sheet steel cage;  
radial internal clearance to internal clearance group C2, actual value inscribed on bearing.

| Mounting dimensions |                | Basic load ratings     |                          | Calculation factors |                |                |                | Fatigue limit load |
|---------------------|----------------|------------------------|--------------------------|---------------------|----------------|----------------|----------------|--------------------|
| D <sub>a</sub>      | r <sub>a</sub> | dyn.<br>C <sub>r</sub> | stat.<br>C <sub>0r</sub> | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub>    |
| max.                | max.           | kN                     | kN                       |                     |                |                |                | kN                 |
| 306                 | 2,5            | 1 340                  | 2 360                    | 0,41                | 1,66           | 2,47           | 1,62           | 111                |
| 326                 | 2,5            | 1 560                  | 2 700                    | 0,42                | 1,62           | 2,42           | 1,59           | 123                |
| 353                 | 3              | 1 760                  | 3 100                    | 0,41                | 1,63           | 2,43           | 1,6            | 139                |
| 383                 | 3              | 1 960                  | 3 450                    | 0,41                | 1,66           | 2,47           | 1,62           | 195                |
| 423                 | 3              | 2 700                  | 5 100                    | 0,42                | 1,61           | 2,4            | 1,58           | 213                |
| 480                 | 4              | 3 000                  | 5 700                    | 0,4                 | 1,67           | 2,49           | 1,63           | 295                |
| 520                 | 4              | 3 550                  | 6 550                    | 0,41                | 1,65           | 2,46           | 1,61           | 265                |
| 580                 | 4              | 4 250                  | 8 150                    | 0,41                | 1,63           | 2,43           | 1,6            | 395                |
| 674                 | 5              | 5 700                  | 11 600                   | 0,4                 | 1,67           | 2,49           | 1,63           | 520                |

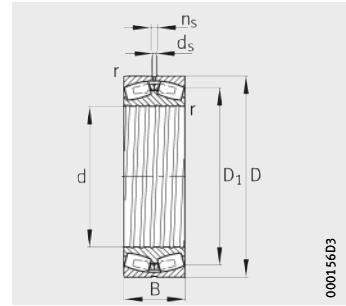


# Special spherical roller bearings

With cylindrical bore for light section lines, with loose fit on the roll journal



Design 1  
Sheet brass cage



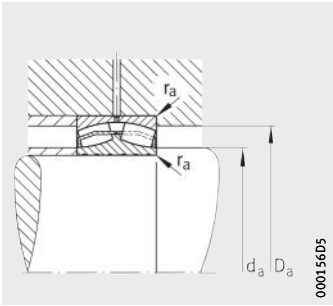
Design 2  
Solid brass cage

**Dimension table** - Dimensions in mm

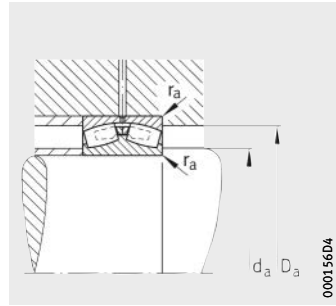
| Designation                    | Design | Mass<br>m<br>≈kg | Dimensions |     |     |   |                |                |                |                |
|--------------------------------|--------|------------------|------------|-----|-----|---|----------------|----------------|----------------|----------------|
|                                |        |                  | d          | D   | B   | r | D <sub>1</sub> | d <sub>2</sub> | d <sub>s</sub> | n <sub>s</sub> |
| Z-568924.23236-B               | 2      | 39               | <b>180</b> | 320 | 112 | 4 | 273,4          | –              | 8              | 15             |
| Z-536423.24138-B               | 1      | 42,1             | <b>190</b> | 320 | 128 | 3 | 270            | 215,7          | 6,3            | 12,2           |
| Z-568923.23140-B               | 2      | 42,8             | <b>200</b> | 340 | 112 | 3 | 293,3          | –              | 9,5            | 17,7           |
| Z-541020.24140-B <sup>1)</sup> | 1      | 51,3             | <b>200</b> | 340 | 140 | 3 | 285,4          | 225,6          | 6,3            | 12,2           |
| Z-522444.24140-B               | 1      | 51,4             | <b>200</b> | 340 | 140 | 3 | 285,9          | 225,6          | 6,3            | 12,2           |
| Z-572037.24044-B               | 2      | 40,6             | <b>220</b> | 340 | 118 | 3 | 297,4          | –              | 6,3            | 12,2           |
| F-804288.23144-B               | 2      | 55,2             | <b>220</b> | 370 | 120 | 4 | 319,2          | –              | 9,5            | 17,7           |
| Z-527514.24144-B               | 1      | 67               | <b>220</b> | 370 | 150 | 4 | 311,7          | 247,1          | 6,3            | 12,2           |
| F-803679.24048-B               | 2      | 43,6             | <b>240</b> | 360 | 118 | 3 | 318,9          | –              | 6,3            | 12,2           |
| Z-517299.24148-B               | 1      | 81               | <b>240</b> | 400 | 160 | 4 | 338            | 270            | 6,3            | 12,2           |
| Z-541021.24148-B <sup>1)</sup> | 1      | 81               | <b>240</b> | 400 | 160 | 4 | 338,6          | 270            | 6,3            | 12,2           |
| Z-572036.24052-B               | 2      | 66               | <b>260</b> | 400 | 140 | 4 | 349,1          | –              | 6,3            | 12,2           |
| Z-530662.24152-B               | 1      | 111              | <b>260</b> | 440 | 180 | 4 | 370,3          | 294,3          | 8              | 15             |
| Z-561779.24152-B <sup>1)</sup> | 1      | 111              | <b>260</b> | 440 | 180 | 4 | 369,4          | 294,3          | 6,3            | 12,2           |
| Z-538565.24056-B               | 2      | 70               | <b>280</b> | 420 | 140 | 4 | 369,5          | –              | 6,3            | 12,2           |
| Z-531079.24156-B               | 1      | 119              | <b>280</b> | 460 | 180 | 5 | 392,8          | 315,9          | 8              | 15             |
| Z-531119.24060-B               | 2      | 101              | <b>300</b> | 460 | 160 | 4 | 401,5          | –              | 8              | 15             |
| Z-541538.24160-B               | 1      | 160              | <b>300</b> | 500 | 200 | 5 | 424,4          | 340,5          | 8              | 15             |
| F-804739.24064-B               | 2      | 107              | <b>320</b> | 480 | 160 | 4 | 424            | –              | 8              | 15             |
| Z-541539.24164-B               | 1      | 199              | <b>320</b> | 540 | 218 | 5 | 456,1          | 377,7          | 9,5            | 17,7           |
| F-804546.24076-B               | 2      | 154              | <b>380</b> | 560 | 180 | 5 | 499            | –              | 9,5            | 17,7           |
| Z-528479.24184-B               | 1      | 443              | <b>420</b> | 700 | 280 | 6 | 590,3          | 476,2          | 12,5           | 23,5           |

All bearings have inner rings made from case hardening steel and a radial internal clearance to C2.

<sup>1)</sup> The inner and outer rings are made from case hardening steel.

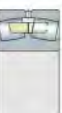


Design 1  
Mounting dimensions



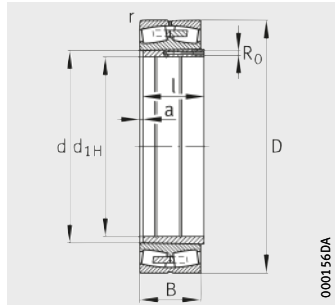
Design 2  
Mounting dimensions

| Mounting dimensions |       |       | Basic load ratings |                   | Calculation factors |       |       |       | Fatigue limit load |
|---------------------|-------|-------|--------------------|-------------------|---------------------|-------|-------|-------|--------------------|
| $d_a$               | $D_a$ | $r_a$ | dyn.<br>$C_r$      | stat.<br>$C_{or}$ | $e$                 | $Y_1$ | $Y_2$ | $Y_0$ | $C_{ur}$           |
| min.                | max.  | max.  | kN                 | kN                |                     |       |       |       | kN                 |
| 197                 | 303   | 3     | 1 320              | 2 160             | 0,36                | 1,87  | 2,79  | 1,83  | 124                |
| 204                 | 306   | 2,5   | 1 400              | 2 500             | 0,41                | 1,66  | 2,47  | 1,62  | 119                |
| 214                 | 326   | 2,5   | 1 320              | 2 280             | 0,35                | 1,95  | 2,9   | 1,91  | 118                |
| 214                 | 326   | 2,5   | 1 700              | 3 000             | 0,42                | 1,62  | 2,42  | 1,59  | 139                |
| 214                 | 326   | 2,5   | 1 700              | 3 000             | 0,42                | 1,62  | 2,42  | 1,59  | 139                |
| 232,4               | 327,6 | 2,5   | 1 400              | 2 700             | 0,34                | 1,96  | 2,92  | 1,92  | 139                |
| 237                 | 353   | 3     | 1 630              | 2 900             | 0,33                | 2,03  | 3,02  | 1,98  | 159                |
| 237                 | 353   | 3     | 1 900              | 3 450             | 0,41                | 1,63  | 2,43  | 1,6   | 155                |
| 252,4               | 347,6 | 2,5   | 1 500              | 2 900             | 0,32                | 2,1   | 3,13  | 2,06  | 157                |
| 257                 | 383   | 3     | 2 080              | 3 800             | 0,41                | 1,66  | 2,47  | 1,62  | 171                |
| 257                 | 383   | 3     | 2 120              | 3 900             | 0,41                | 1,66  | 2,47  | 1,62  | 171                |
| 274,6               | 385,4 | 3     | 1 900              | 3 800             | 0,35                | 1,94  | 2,88  | 1,89  | 181                |
| 277                 | 423   | 3     | 2 700              | 5 100             | 0,42                | 1,61  | 2,4   | 1,58  | 214                |
| 277                 | 423   | 3     | 2 700              | 5 100             | 0,42                | 1,61  | 2,4   | 1,58  | 214                |
| 294,6               | 405,4 | 3     | 2 000              | 4 000             | 0,33                | 2,04  | 3,04  | 2     | 194                |
| 300                 | 440   | 4     | 2 700              | 5 200             | 0,39                | 1,71  | 2,54  | 1,67  | 219                |
| 314,6               | 445,4 | 3     | 2 500              | 5 200             | 0,35                | 1,95  | 2,9   | 1,91  | 235                |
| 320                 | 480   | 4     | 3 250              | 6 300             | 0,4                 | 1,67  | 2,49  | 1,63  | 260                |
| 334,6               | 465,4 | 3     | 2 600              | 5 400             | 0,33                | 2,06  | 3,06  | 2,01  | 250                |
| 340                 | 520   | 4     | 3 750              | 7 200             | 0,41                | 1,65  | 2,46  | 1,61  | 530                |
| 398                 | 542   | 4     | 3 350              | 7 200             | 0,31                | 2,15  | 3,2   | 2,1   | 335                |
| 446                 | 674   | 5     | 6 200              | 12 700            | 0,4                 | 1,67  | 2,49  | 1,63  | 980                |

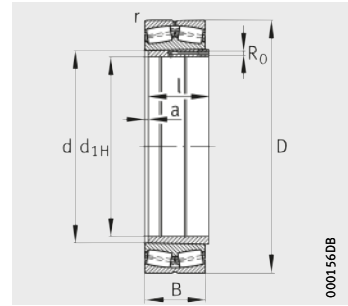


# Special spherical roller bearings

Bearings of dimension series 49  
With sleeve  
For converters



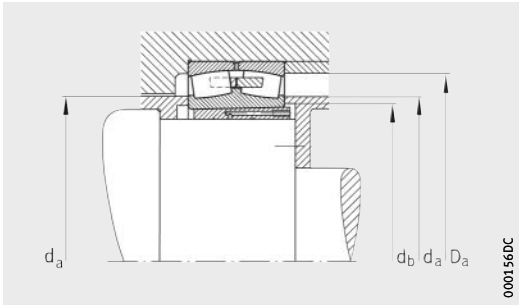
Design 1  
With solid brass cage MB



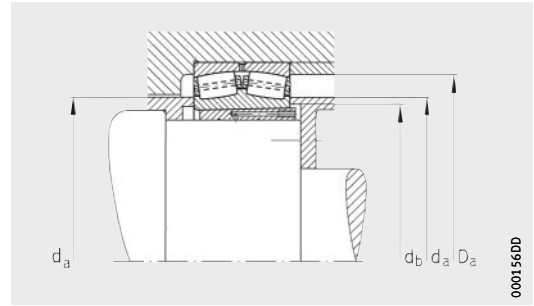
Design 2  
With pin cage

**Dimension table** - Dimensions in mm

| Designation             |             | De-<br>sign | Mass<br>m |        | Initial<br>grease filling<br>quantity | Dimensions      |      |      |     |      |
|-------------------------|-------------|-------------|-----------|--------|---------------------------------------|-----------------|------|------|-----|------|
| Bearing                 | Sleeve      |             | Bearing   | Sleeve |                                       | Bearing         |      |      |     |      |
|                         |             |             | ≈kg       | ≈kg    | ≈kg                                   | d <sub>1H</sub> | d    | D    | B   | r    |
|                         |             |             |           |        |                                       |                 |      |      |     | min. |
| Z-528741.PRL-K30        | Z-524974.KH | 1           | 167       | 33     | 5                                     | 470             | 500  | 670  | 170 | 5    |
| Z-541821.249/500-K30    | Z-524974.KH | 2           | 177       | 33     | 5                                     | 470             | 500  | 670  | 170 | 5    |
| Z-528742.PRL-K30        | Z-524976.KH | 1           | 208       | 38     | 5                                     | 500             | 530  | 710  | 180 | 5    |
| Z-541822.249/530-K30    | Z-524976.KH | 2           | 209       | 38     | 5                                     | 500             | 530  | 710  | 180 | 5    |
| Z-528743.PRL-K30        | Z-524978.KH | 1           | 235       | 44     | 6                                     | 530             | 560  | 750  | 190 | 6    |
| Z-541823.249/560-B-K30  | Z-524978.KH | 2           | 247       | 44     | 6                                     | 530             | 560  | 750  | 190 | 5    |
| Z-528744.PRL-K30        | Z-524980.KH | 1           | 281       | 48     | 7                                     | 570             | 600  | 800  | 200 | 5    |
| Z-541824.249/600-B-K30  | Z-524980.KH | 2           | 294       | 48     | 7                                     | 570             | 600  | 800  | 200 | 5    |
| Z-541825.249/630-K30    | Z-524982.KH | 2           | 375       | 60     | 9                                     | 600             | 630  | 850  | 218 | 6    |
| Z-528746.PRL-K30        | Z-524984.KH | 1           | 418       | 78     | 10                                    | 630             | 670  | 900  | 230 | 7,5  |
| Z-541826.249/670-K30    | Z-524984.KH | 2           | 435       | 78     | 10                                    | 630             | 670  | 900  | 230 | 6    |
| Z-528747.PRL-K30        | Z-524986.KH | 1           | 491       | 95     | 12                                    | 670             | 710  | 950  | 243 | 6    |
| Z-541827.249/710-B-K30  | Z-524986.KH | 2           | 526       | 95     | 12                                    | 670             | 710  | 950  | 243 | 6    |
| Z-528748.PRL-K30        | Z-524988.KH | 1           | 549       | 105    | 14                                    | 710             | 750  | 1000 | 250 | 6    |
| Z-541828.249/750-B-K30  | Z-524988.KH | 2           | 572       | 105    | 14                                    | 710             | 750  | 1000 | 250 | 6    |
| Z-528749.PRL-K30        | Z-524990.KH | 1           | 621       | 140    | 15                                    | 750             | 800  | 1060 | 258 | 7,5  |
| Z-541829.249/800-B-K30  | Z-524990.KH | 2           | 646       | 140    | 15                                    | 750             | 800  | 1060 | 258 | 7,5  |
| Z-528750.PRL-K30        | Z-524992.KH | 1           | 719       | 155    | 18                                    | 800             | 850  | 1120 | 272 | 6    |
| Z-541830.249/850-B-K30  | Z-524992.KH | 2           | 695       | 155    | 18                                    | 800             | 850  | 1120 | 272 | 6    |
| Z-528751.PRL-K30        | Z-524994.KH | 1           | 816       | 175    | 20                                    | 850             | 900  | 1180 | 280 | 6    |
| Z-541831.249/900-B-K30  | Z-524994.KH | 2           | 849       | 175    | 20                                    | 850             | 900  | 1180 | 280 | 6    |
| Z-528752.PRL-K30        | Z-524996.KH | 1           | 1000      | 200    | 25                                    | 900             | 950  | 1250 | 300 | 7,5  |
| Z-541832.249/950-B-K30  | Z-524996.KH | 2           | 1040      | 200    | 25                                    | 900             | 950  | 1250 | 300 | 7,5  |
| Z-528753.PRL-K30        | Z-524998.KH | 1           | 1120      | 225    | 30                                    | 950             | 1000 | 1320 | 315 | 7,5  |
| Z-541833.249/1000-B-K30 | Z-524998.KH | 2           | 1230      | 225    | 30                                    | 950             | 1000 | 1320 | 315 | 7,5  |
| Z-541834.249/1060-B-K30 | Z-525500.KH | 2           | 1470      | 290    | 35                                    | 1000            | 1060 | 1400 | 335 | 7,5  |
| Z-541835.249/1120-B-K30 | Z-525001.KH | 2           | 1520      | 305    | 37                                    | 1060            | 1120 | 1460 | 335 | 7,5  |
| Z-541836.249/1180-B-K30 | Z-525003.KH | 2           | 1750      | 340    | 43                                    | 1120            | 1180 | 1540 | 355 | 7,5  |
| Z-541837.249/1250-B-K30 | Z-525005.KH | 2           | 2160      | 390    | 50                                    | 1180            | 1250 | 1630 | 375 | 7,5  |
| Z-541838.249/1320-B-K30 | Z-525007.KH | 2           | 2530      | 485    | 60                                    | 1250            | 1320 | 1720 | 400 | 7,5  |

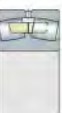


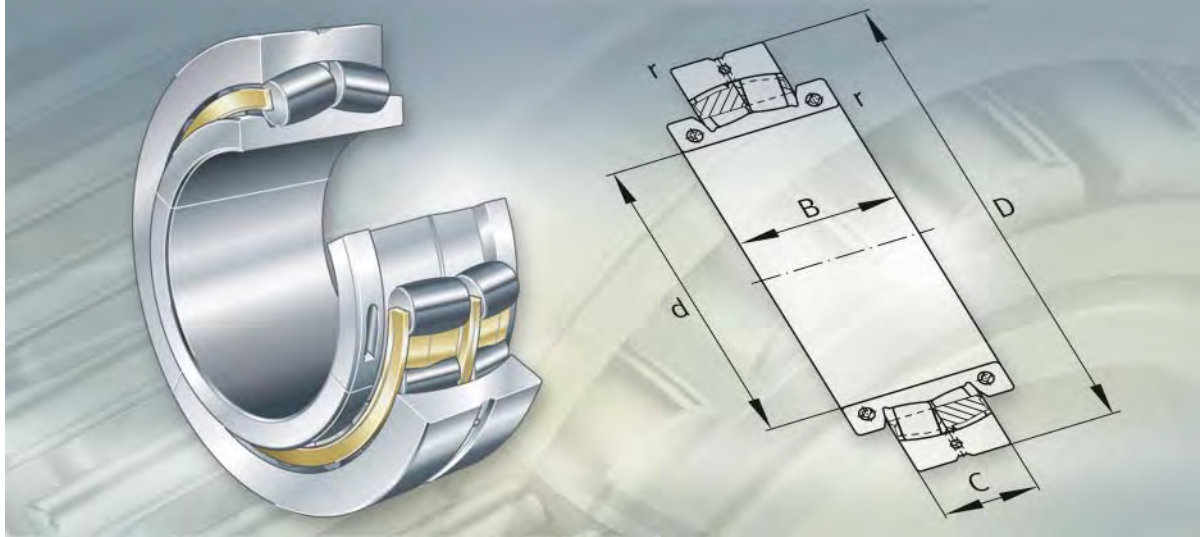
Design 1  
Mounting dimensions



Design 2  
Mounting dimensions

| Sleeve |        |                               | Mounting dimensions |                |                        | Basic load rating              | Calculation factor |
|--------|--------|-------------------------------|---------------------|----------------|------------------------|--------------------------------|--------------------|
| l      | a<br>≈ | R <sub>0</sub>                | d <sub>a</sub>      | D <sub>a</sub> | d <sub>b</sub><br>min. | stat.<br>C <sub>0r</sub><br>kN | Y <sub>0</sub>     |
| 170    | 20     | G <sup>1</sup> / <sub>8</sub> | 540                 | 640            | 515                    | 7 200                          | 3,07               |
| 170    | 20     | G <sup>1</sup> / <sub>8</sub> | 540                 | 640            | 515                    | 9 300                          | 2,97               |
| 180    | 20     | G <sup>1</sup> / <sub>8</sub> | 570                 | 675            | 545                    | 8 150                          | 3,07               |
| 180    | 20     | G <sup>1</sup> / <sub>8</sub> | 570                 | 675            | 545                    | 10 200                         | 2,97               |
| 190    | 20     | G <sup>1</sup> / <sub>8</sub> | 600                 | 710            | 575                    | 10 000                         | 3,13               |
| 190    | 20     | G <sup>1</sup> / <sub>8</sub> | 600                 | 710            | 575                    | 11 600                         | 3                  |
| 200    | 20     | G <sup>1</sup> / <sub>4</sub> | 645                 | 755            | 615                    | 10 800                         | 3,13               |
| 200    | 20     | G <sup>1</sup> / <sub>4</sub> | 645                 | 755            | 615                    | 12 900                         | 3                  |
| 218    | 22     | G <sup>1</sup> / <sub>4</sub> | 675                 | 805            | 645                    | 15 600                         | 2,94               |
| 230    | 22     | G <sup>1</sup> / <sub>4</sub> | 720                 | 850            | 685                    | 13 700                         | 3,03               |
| 230    | 22     | G <sup>1</sup> / <sub>4</sub> | 720                 | 850            | 685                    | 17 000                         | 2,97               |
| 243    | 22     | G <sup>1</sup> / <sub>4</sub> | 760                 | 900            | 725                    | 15 600                         | 3,07               |
| 243    | 22     | G <sup>1</sup> / <sub>4</sub> | 760                 | 900            | 725                    | 18 000                         | 2,97               |
| 250    | 22     | G <sup>1</sup> / <sub>4</sub> | 800                 | 950            | 765                    | 17 000                         | 3,13               |
| 250    | 22     | G <sup>1</sup> / <sub>4</sub> | 800                 | 950            | 765                    | 19 600                         | 3,23               |
| 258    | 22     | G <sup>1</sup> / <sub>4</sub> | 860                 | 1 010          | 820                    | 18 600                         | 3,23               |
| 258    | 22     | G <sup>1</sup> / <sub>4</sub> | 860                 | 1 010          | 820                    | 22 800                         | 3,1                |
| 272    | 22     | G <sup>1</sup> / <sub>4</sub> | 910                 | 1 070          | 870                    | 20 400                         | 3,2                |
| 272    | 22     | G <sup>1</sup> / <sub>4</sub> | 910                 | 1 070          | 870                    | 22 400                         | 3,2                |
| 280    | 25     | G <sup>1</sup> / <sub>4</sub> | 960                 | 1 120          | 920                    | 22 400                         | 3,3                |
| 280    | 25     | G <sup>1</sup> / <sub>4</sub> | 960                 | 1 120          | 920                    | 27 000                         | 3,34               |
| 300    | 25     | G <sup>1</sup> / <sub>4</sub> | 1 015               | 1 190          | 970                    | 25 500                         | 3,2                |
| 300    | 25     | G <sup>1</sup> / <sub>4</sub> | 1 015               | 1 190          | 970                    | 29 000                         | 3,3                |
| 315    | 25     | G <sup>1</sup> / <sub>4</sub> | 1 065               | 1 250          | 1 025                  | 28 000                         | 3,34               |
| 315    | 25     | G <sup>1</sup> / <sub>4</sub> | 1 065               | 1 250          | 1 025                  | 35 500                         | 3,16               |
| 335    | 25     | G <sup>1</sup> / <sub>4</sub> | 1 135               | 1 325          | 1 085                  | 36 500                         | 3,23               |
| 335    | 27     | G <sup>1</sup> / <sub>4</sub> | 1 195               | 1 385          | 1 145                  | 41 500                         | 3,3                |
| 355    | 27     | G <sup>1</sup> / <sub>4</sub> | 1 260               | 1 460          | 1 205                  | 42 500                         | 3,34               |
| 375    | 27     | G <sup>1</sup> / <sub>4</sub> | 1 330               | 1 550          | 1 275                  | 50 000                         | 3,42               |
| 400    | 28     | G <sup>1</sup> / <sub>4</sub> | 1 400               | 1 640          | 1 350                  | 52 000                         | 3,46               |



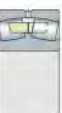


**Split spherical roller bearings**



# Split spherical roller bearings

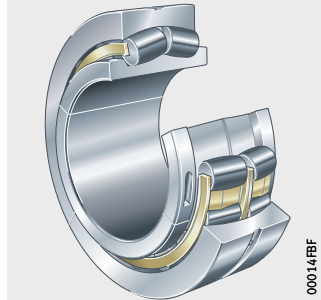
|                                     | Page  |
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|                                     | Inner ring with three rigid ribs ..... 706      |
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## Product overview Split spherical roller bearings

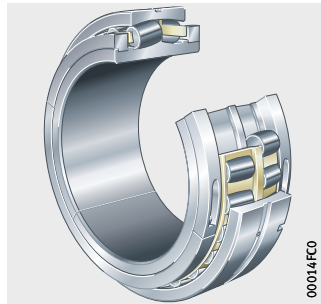
### Inner ring without central rib

222S, 222SM, 230S, 230SM,  
231S, 231SM



### Inner ring with three rigid ribs

230SM, 231SM, 239SM,  
240SM, 241SM, Z-5..PRL-03



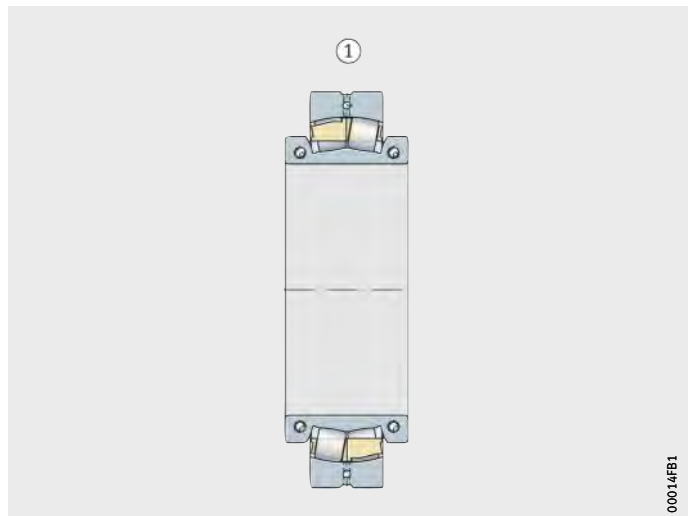
# Split spherical roller bearings

**Features** Split cylindrical roller bearings are used in bearing positions that can only be accessed with difficulty, for example on cranked and very long shafts. They are mainly used where the replacement of an unsplit spherical roller bearing would require costly additional work. The use of split spherical roller bearings shortens the downtime of machinery and plant and reduces costs. Split spherical roller bearings have a cylindrical bore. The inner ring, outer ring and cage with the roller set are split in half. The split bearing rings are held together by screws.

**Main dimensions** The main dimensions (outside diameter, outer ring width, bore diameter) are designed such that split spherical roller bearings can in general be fitted in our split plummer block housings instead of unsplit bearings with an adapter sleeve. The bearings are available for metric shafts and for inch size shafts.

**Inner ring without central rib** The internal construction of this standard design was carried over from the proven spherical roller bearing E1. Bearings without a central rib have the highest possible load carrying capacity. In Design 1, the locking rings are integrated in the inner rings, *Figure 1*.

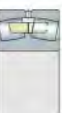
Design 1 ■ The bearings have solid brass cages.



① Design 1 with brass cages

*Figure 1*  
Split spherical roller bearing,  
inner ring without central rib

00014FB1

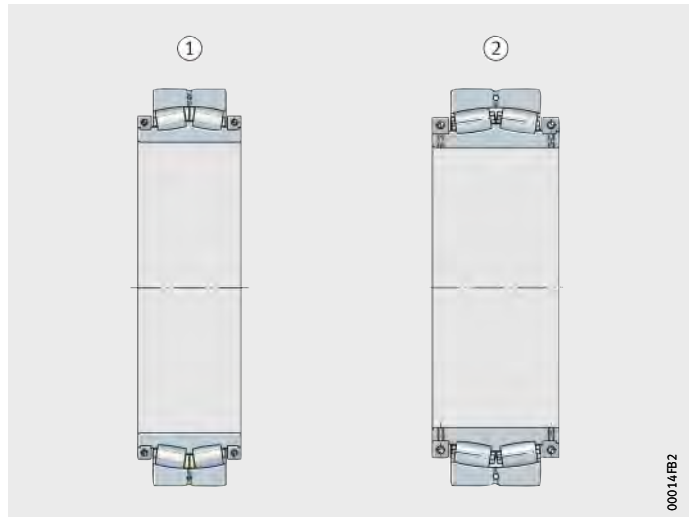


# Split spherical roller bearings

## Inner ring with three rigid ribs

Split spherical roller bearings with three rigid ribs and separate locking rings are used, for example, where large temperature differentials can occur between the shaft and inner ring halves, *Figure 2*.

- Design 2
  - These split spherical roller bearings with three rigid ribs and separate locking rings have solid brass cages.
  - The bearings are used, for example, in conveying equipment.
- Design 3
  - This design with three rigid ribs has solid pin cages made from steel and separate locking rings.
  - The bearings are designed for extreme loads, such as those occurring in converters.
  - The main dimensions of the bearings, with the exception of the inner ring width, are matched to those of unsplit spherical roller bearings of series 249 with a cylindrical bore or with a tapered bore and sleeve.



- ① Design 2 with brass cages
- ② Design 3 with pin cages

*Figure 2*  
Split spherical roller bearings,  
inner ring with three rigid ribs

## Radial and axial load capacity

Spherical roller bearings can support axial loads in both directions and high radial loads. Due to the maximum number of rollers with the largest possible dimensions, bearings without a central rib have a particularly high load carrying capacity.

The basic load ratings of split bearings are, however, generally lower than those of unsplit bearings, since the reference circle of the rollers is smaller due to the screw connections in the outer ring.



If the inner rings are not axially abutted, the permissible axial load must be observed, see dimension table.

## Sealing

Split spherical roller bearings are not sealed.

## Lubrication

The bearings are normally lubricated with lithium soap grease of consistency class 2 with EP additives.

The outer ring has a circumferential groove and three lubrication holes for lubrication.

## Compensation of angular misalignments

Split spherical roller bearings compensate angular misalignments in the same way as unsplit bearings.

The static angular misalignment (rotating inner ring, constant angular deviation) should be no more than 1,5°.

In the case of converter bearings, the value is restricted to just 10', since gradual subsidence of the foundations and thermal influences must be taken into consideration.

If dynamic angular misalignments are present, for example where there is a rotating outer ring or rotating inner ring, please contact us.

## Operating temperature

Split spherical roller bearings are dimensionally stable up to +200 °C. Bearings with metal cages can be used at operating temperatures from -30 °C to +200 °C.

## Cages

In the case of split spherical roller bearings of standard design with metric dimensions, the cage design can be identified from the designation. The suffix MA indicates solid brass cages guided on the outer ring.

In the case of bearings with an inch size bore  $\geq 7$  inch, the suffix for the solid brass cages is not used.

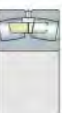
Due to the high loads involved, split spherical roller bearings for converters normally have pin cages that can accommodate the largest possible number of through-drilled rollers.

## Suffixes

Suffixes for available designs: see table.

## Available designs

| Suffix | Description                             | Design   |
|--------|---|----------|
| MA     | Solid brass cages, guided on outer ring | Standard |



# Split spherical roller bearings

## Design and safety guidelines

### Equivalent dynamic bearing load

For split spherical roller bearings subjected to dynamic loads, the overrolling of the joints is taken into consideration in calculation of the equivalent dynamic load by applying the shock factor 1,1.

For split spherical roller bearings under dynamic loading, the following applies:

### Load ratio and equivalent dynamic load

| Load ratio               | Equivalent dynamic load                          |
|--------------------------|--|
| $\frac{F_a}{F_r} \leq e$ | $P = 1,1 \cdot (F_r + Y_1 \cdot F_a)$            |
| $\frac{F_a}{F_r} > e$    | $P = 1,1 \cdot (0,67 \cdot F_r + Y_2 \cdot F_a)$ |

P kN  
Equivalent dynamic bearing load for combined load  
F<sub>a</sub> kN  
Axial dynamic bearing load  
F<sub>r</sub> kN  
Radial dynamic bearing load  
e, Y<sub>1</sub>, Y<sub>2</sub> –  
Factors, see dimension tables.

### Equivalent static bearing load

For split spherical roller bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

P<sub>0</sub> kN  
Equivalent static bearing load for combined load  
F<sub>0a</sub> kN  
Axial static bearing load

In the case of split spherical roller bearings used as locating bearings on converters, F<sub>0a</sub> is determined from the external axial load and the reaction force due to non-locating bearing displacement, which can be taken as 15% of the maximum radial force of the non-locating bearing.

F<sub>0r</sub> kN  
Radial static bearing load  
Y<sub>0</sub> –  
Factor, see dimension tables.

### Static load safety factor

The static load safety factor S<sub>0</sub> of converter bearings should be:

$$S_0 \geq 2$$

$$S_0 = \frac{C_{0r}}{P_0}$$

S<sub>0</sub> –  
Static load safety factor  
C<sub>0r</sub> kN  
Basic static load rating, see dimension tables  
P<sub>0</sub> kN  
Equivalent static bearing load for combined load.

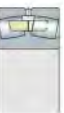


# Split spherical roller bearings

**Accuracy** Split spherical roller bearings have normal tolerances used for unsplit radial bearings. The dimensional and running tolerances correspond to tolerance class PN to DIN 620-2.

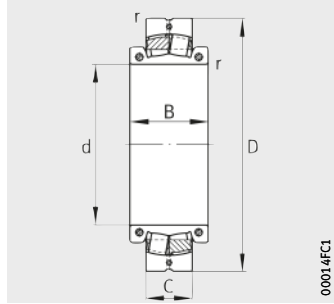
The radial internal clearance of split spherical roller bearings corresponds to internal clearance group CN for unsplit bearings with a cylindrical bore (DIN 620-4). The radial internal clearance of split spherical roller bearings for converters is selected in accordance with the operating temperature and the mounting fits.



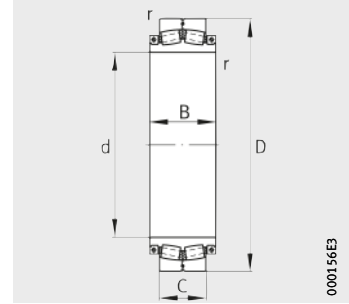


# Spherical roller bearings

## Split



Design 1  
Inner ring without central rib



Design 2  
Inner ring with three rigid ribs,  
separate locking rings

Dimension table - Dimensions in mm

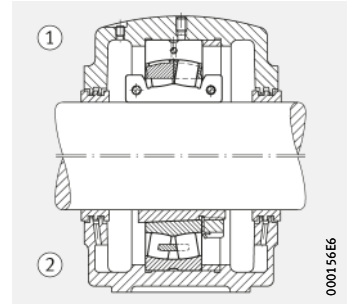
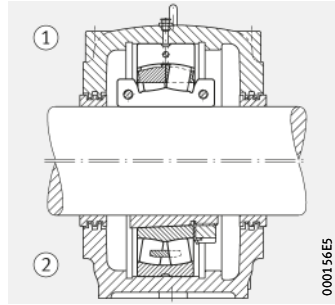
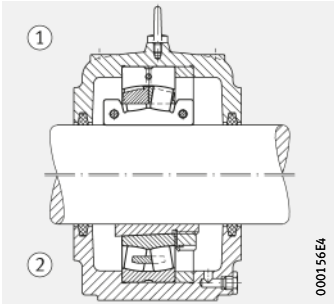
| Designation  | Design          | Mass<br>m<br>≈kg | Dimensions |     |     |     |           | Basic load ratings           |                                | Calculation factors |                |                |                |
|--------------|-----------------|------------------|------------|-----|-----|-----|-----------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|
|              |                 |                  | d          | D   | B   | C   | r<br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> |
| 231SM170-MA  | 1               | 40,6             | 170        | 320 | 142 | 104 | 2,1       | 915                          | 1 430                          | 0,28                | 2,37           | 3,53           | 2,32           |
| 231SM180-MA  | 1               | 56,4             | 180        | 340 | 160 | 112 | 3         | 1 020                        | 1 530                          | 0,29                | 2,32           | 3,45           | 2,26           |
| 222SM180-MA  | 1               | 55,7             | 180        | 360 | 154 | 98  | 4         | 1 140                        | 1 630                          | 0,25                | 2,71           | 4,04           | 2,65           |
| 222S.703     | 1               | 59               | 182,563    | 360 | 154 | 98  | 4         | 1 140                        | 1 630                          | 0,25                | 2,71           | 4,04           | 2,65           |
| 222S.708     | 1               | 76,8             | 190,5      | 400 | 162 | 108 | 4         | 1 340                        | 1 900                          | 0,25                | 2,69           | 4              | 2,63           |
| Z-540788.PRL | 1 <sup>1)</sup> | 39               | 200        | 330 | 135 | 82  | 3,5       | 865                          | 1 500                          | 0,26                | 2,55           | 3,8            | 2,5            |
| 230SM200-MA  | 1               | 41,5             | 200        | 340 | 136 | 90  | 3         | 965                          | 1 530                          | 0,23                | 2,9            | 4,31           | 2,83           |
| 231SM200-MA  | 1               | 61,8             | 200        | 370 | 175 | 120 | 4         | 1 320                        | 2 040                          | 0,31                | 2,21           | 3,29           | 2,16           |
| 222SM200-MA  | 1               | 73,5             | 200        | 400 | 162 | 108 | 4         | 1 340                        | 1 900                          | 0,25                | 2,69           | 4              | 2,63           |
| 222S.715     | 1               | 75,4             | 201,613    | 400 | 162 | 108 | 4         | 1 340                        | 1 900                          | 0,25                | 2,69           | 4              | 2,63           |
| 222S.800     | 1               | 74,7             | 203,2      | 400 | 162 | 108 | 4         | 1 340                        | 1 900                          | 0,25                | 2,69           | 4              | 2,63           |
| 230S.807     | 1               | 58,9             | 214,313    | 360 | 156 | 92  | 3         | 1 100                        | 1 830                          | 0,23                | 2,9            | 4,31           | 2,83           |
| 230S.808     | 1               | 58,9             | 215,9      | 360 | 156 | 92  | 3         | 1 100                        | 1 830                          | 0,23                | 2,9            | 4,31           | 2,83           |
| 230SM220-MA  | 1               | 56,5             | 220        | 360 | 156 | 92  | 3         | 1 100                        | 1 830                          | 0,23                | 2,9            | 4,31           | 2,83           |
| 231SM220-MA  | 1               | 86               | 220        | 400 | 190 | 128 | 4         | 1 630                        | 2 600                          | 0,3                 | 2,25           | 3,34           | 2,2            |
| 222SM220-MA  | 1               | 96,3             | 220        | 440 | 170 | 120 | 4         | 1 460                        | 2 080                          | 0,25                | 2,71           | 4,04           | 2,65           |
| 230S.900     | 1               | 52,8             | 228,6      | 360 | 160 | 92  | 3         | 1 100                        | 1 830                          | 0,23                | 2,9            | 4,31           | 2,83           |
| 231S.907     | 1               | 113              | 239,713    | 440 | 210 | 144 | 4         | 1 860                        | 3 050                          | 0,3                 | 2,28           | 3,39           | 2,23           |
| Z-540436.PRL | 1 <sup>1)</sup> | 60               | 240        | 375 | 150 | 92  | 4         | 1 060                        | 1 960                          | 0,25                | 2,74           | 4,08           | 2,68           |
| 230SM240-MA  | 1               | 57,4             | 240        | 400 | 160 | 104 | 4         | 1 220                        | 2 120                          | 0,22                | 3,04           | 4,53           | 2,97           |
| Z-527567.PRL | 2 <sup>2)</sup> | 68               | 240        | 400 | 166 | 104 | 4         | 1 460                        | 2 450                          | 0,23                | 2,95           | 4,4            | 2,89           |
| 231SM240-MA  | 1               | 118              | 240        | 440 | 210 | 144 | 4         | 1 860                        | 3 050                          | 0,3                 | 2,28           | 3,39           | 2,23           |
| 222SM240-MA  | 1               | 129              | 240        | 480 | 200 | 130 | 5         | 1 860                        | 2 600                          | 0,26                | 2,64           | 3,93           | 2,58           |
| 230S.908     | 1               | 56,8             | 241,3      | 400 | 160 | 104 | 4         | 1 220                        | 2 120                          | 0,22                | 3,04           | 4,53           | 2,97           |
| 230S.1000    | 1               | 71,2             | 254        | 420 | 170 | 106 | 4         | 1 460                        | 2 450                          | 0,23                | 2,95           | 4,4            | 2,89           |
| 230SM260-MA  | 1               | 68               | 260        | 420 | 170 | 106 | 4         | 1 460                        | 2 450                          | 0,23                | 2,95           | 4,4            | 2,89           |
| 231S.915     | 1               | 116              | 260        | 460 | 190 | 146 | 5         | 2 280                        | 3 800                          | 0,3                 | 2,23           | 3,32           | 2,18           |
| 231SM260-MA  | 1               | 111              | 260        | 460 | 190 | 146 | 5         | 2 280                        | 3 800                          | 0,3                 | 2,23           | 3,32           | 2,18           |
| 222SM260-MA  | 1               | 130              | 260        | 500 | 200 | 130 | 5         | 2 200                        | 3 100                          | 0,25                | 2,67           | 3,97           | 2,61           |
| 230S.1008    | 1               | 64,3             | 266,7      | 420 | 170 | 106 | 4         | 1 460                        | 2 450                          | 0,23                | 2,95           | 4,4            | 2,89           |
| 230S.1100    | 1               | 91,7             | 279,4      | 460 | 176 | 118 | 4         | 1 600                        | 2 800                          | 0,22                | 3,04           | 4,53           | 2,97           |
| 231S.1100    | 1               | 150              | 279,4      | 500 | 218 | 160 | 5         | 2 320                        | 3 900                          | 0,29                | 2,32           | 3,45           | 2,26           |

1) With central rib.

2) Without central rib.

3) For inner rings without axial abutment.

4) The bearings will also fit in housings from other manufacturers if the internal dimensions are identical.



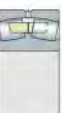
Locating bearings  
S30

① Split bearing, ② unsplit bearing

Non-locating bearings  
SD

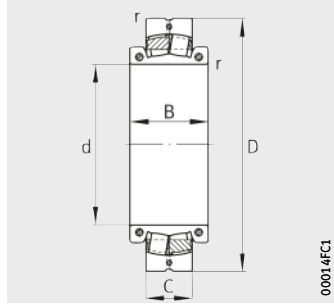
Locating bearings  
SAF and SDAF

| Fatigue limit load<br>$C_{ur}$<br>kN | Permissible axial load <sup>3)</sup><br>$F_a$ max.<br>kN | Limiting speed<br>$n_G$<br>$min^{-1}$ | Tightening torque for screws |             | Possible replacement for unsplit spherical roller bearing with adapter sleeve |                |                | Suitable plummer block housing <sup>4)</sup> |
|--------------------------------------|--|---------------------------------------|------------------------------|-------------|---|----------------|----------------|--|
|                                      |  |                                       | $M_i$<br>Nm                  | $M_a$<br>Nm | Bearing   | Adapter sleeve | Adapter sleeve |  |
| 114                                  | 22   | 630                                   | 69                           | 35          | 23138K  | H3138          | –              | SD3138TS                                     |
| 119                                  | 22   | 600                                   | 69                           | 35          | 23140K  | H3140          | –              | SD3140TS                                     |
| 104                                  | 22,2   | 600                                   | 69                           | 35          | 22240K  | H3140          | –              | SD540  |
| 104                                  | 22,2   | 600                                   | 69                           | 35          | 22240K  | SNW40.703      | H3140X703      | SAF540                                       |
| 121                                  | 32   | 560                                   | 120                          | 69          | 22244K  | SNW44.708      | H3144XX708     | SAF544/7.1/2                                 |
| 145                                  | –  | –                                     | –                            | –           | –   | –              | –              | –  |
| 136                                  | 22,2   | 630                                   | 69                           | 35          | 23044K  | H3044X         | –              | S3044K                                       |
| 151                                  | 32   | 530                                   | 120                          | 69          | 23144K  | H3144X         | –              | SD3144TS                                     |
| 121                                  | 32   | 560                                   | 120                          | 69          | 22244K  | H3144X         | –              | SD544  |
| 121                                  | 32   | 560                                   | 120                          | 69          | 22244K  | SNW44.715      | H3144XX715     | SAF544                                       |
| 121                                  | 32   | 560                                   | 120                          | 69          | 22244K  | SNW44.800      | H3144XX800     | SAF544/8                                     |
| 152                                  | 32   | 560                                   | 120                          | 35          | 23048K  | SNP3048.807    | H3048X807      | SAF048K/8.7/16                               |
| 152                                  | 32   | 560                                   | 120                          | 35          | 23048K  | SNP3048.808    | H3048X808      | SAF048K/8.1/2                                |
| 152                                  | 32   | 560                                   | 120                          | 35          | 23048K  | H3048          | –              | S3048K                                       |
| 191                                  | 32   | 480                                   | 120                          | 69          | 23148K  | H3148X         | –              | SD3148TS                                     |
| 126                                  | 32   | 500                                   | 120                          | 69          | 22248K  | H3148X         | –              | SD548  |
| 152                                  | 32   | 560                                   | 120                          | 35          | 23048K  | SNP3048.900    | H3048X900      | SAF048K/9                                    |
| 218                                  | 32   | 450                                   | 120                          | 69          | 23152K  | SNP3152.907    | H3152XX907     | SDAF3152K/9.7/16                             |
| 166                                  | –  | –                                     | –                            | –           | –   | –              | –              | –  |
| 177                                  | 32   | 560                                   | 120                          | 69          | 23052K  | H3052          | –              | S3052K                                       |
| 200                                  | –  | –                                     | –                            | –           | –   | –              | –              | –  |
| 218                                  | 32   | 450                                   | 120                          | 69          | 23152K  | H3152X         | –              | SD3152TS                                     |
| 157                                  | 60   | 450                                   | 295                          | 120         | 22252K  | H3152X         | –              | SD552  |
| 177                                  | 32   | 560                                   | 120                          | 69          | 23052K  | SNP3052.908    | H3052XX908     | SAF052K/9.1/2                                |
| 200                                  | 32   | 500                                   | 120                          | 35          | 23056K  | SNP3056.1000   | H3056X1000     | SAF056K/10                                   |
| 200                                  | 32   | 500                                   | 120                          | 35          | 23056K  | H3056          | –              | S3056K                                       |
| 255                                  | 32   | 400                                   | 120                          | 35          | 23156K  | SNP3156.915    | H3156XX915     | SDAF3156K/9.15/16                            |
| 255                                  | 32   | 400                                   | 120                          | 35          | 23156K  | H3156X         | –              | SD3156TS                                     |
| 182                                  | 60   | 430                                   | 295                          | 69          | 22256K  | H3156X         | –              | SD556  |
| 200                                  | 32   | 500                                   | 120                          | 35          | 23056K  | SNP3056.1008   | H3056X1008     | SAF056K/10.1/2                               |
| 228                                  | 32   | 480                                   | 120                          | 69          | 23060K  | SNP3060.1100   | H3060X1100     | SDAF060K/11                                  |
| 265                                  | 44   | 400                                   | 190                          | 120         | 23160K  | SNP3160.1100   | H3160HGX1100   | SDAF3160K/11                                 |

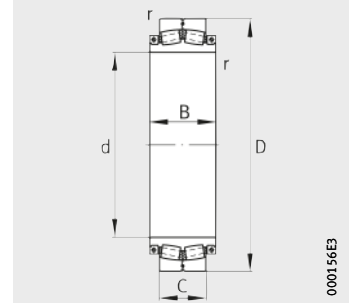


# Spherical roller bearings

Split



Design 1  
Inner ring without central rib



Design 2  
Inner ring with three rigid ribs,  
separate locking rings

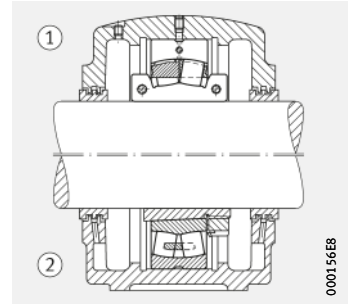
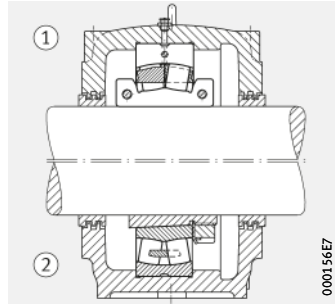
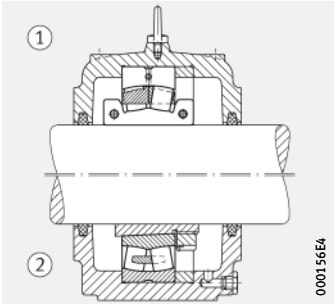
Dimension table (continued) · Dimensions in mm

| Designation  | Design          | Mass<br>m<br>≈kg | Dimensions   |     |     |     |           | Basic load ratings           |                                | Calculation factors |                |                |                |
|--------------|-----------------|------------------|--------------|-----|-----|-----|-----------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|
|              |                 |                  | d            | D   | B   | C   | r<br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> |
| Z-533468.PRL | 2               | 77               | <b>280</b>   | 420 | 202 | 140 | 5         | 1 830                        | 3 550                          | 0,33                | 2,04           | 3,04           | 2              |
| Z-541420.PRL | 1 <sup>1)</sup> | 85               | <b>280</b>   | 455 | 172 | 106 | 5         | 1 370                        | 2 550                          | 0,25                | 2,74           | 4,08           | 2,68           |
| 230SM280-MA  | 1               | 97               | <b>280</b>   | 460 | 176 | 118 | 4         | 1 600                        | 2 800                          | 0,22                | 3,04           | 4,53           | 2,97           |
| 231SM280-MA  | 1               | 145              | <b>280</b>   | 500 | 218 | 160 | 5         | 2 320                        | 3 900                          | 0,29                | 2,32           | 3,45           | 2,26           |
| 222SM280-MA  | 1               | 184              | <b>280</b>   | 540 | 200 | 140 | 5         | 2 400                        | 3 550                          | 0,24                | 2,79           | 4,15           | 2,73           |
| Z-538380.PRL | 2               | 87,8             | <b>300</b>   | 460 | 168 | 118 | 5         | 1 700                        | 3 100                          | 0,25                | 2,69           | 4              | 2,63           |
| 230SM300-MA  | 1               | 108              | <b>300</b>   | 480 | 186 | 121 | 4         | 1 860                        | 3 200                          | 0,23                | 2,9            | 4,31           | 2,83           |
| Z-541421.PRL | 1 <sup>1)</sup> | 117              | <b>300</b>   | 490 | 195 | 118 | 4         | 1 800                        | 3 250                          | 0,25                | 2,69           | 4              | 2,63           |
| 231SM300-MA  | 1               | 184              | <b>300</b>   | 540 | 225 | 176 | 5         | 2 750                        | 4 750                          | 0,29                | 2,3            | 3,42           | 2,25           |
| 222SM300-MA  | 1               | 214              | <b>300</b>   | 580 | 212 | 150 | 5         | 2 650                        | 4 050                          | 0,24                | 2,84           | 4,23           | 2,78           |
| 230S.1200    | 1               | 96,5             | <b>304,8</b> | 480 | 186 | 121 | 4         | 1 860                        | 3 200                          | 0,23                | 2,9            | 4,31           | 2,83           |
| 231S.1200    | 1               | 182              | <b>304,8</b> | 540 | 225 | 176 | 5         | 2 750                        | 4 750                          | 0,29                | 2,3            | 3,42           | 2,25           |
| 230SM320-MA  | 1               | 132              | <b>320</b>   | 520 | 200 | 133 | 5         | 2 040                        | 3 650                          | 0,22                | 3,04           | 4,53           | 2,97           |
| Z-541422.PRL | 1 <sup>1)</sup> | 134              | <b>320</b>   | 520 | 202 | 121 | 5         | 1 930                        | 3 750                          | 0,25                | 2,74           | 4,08           | 2,68           |
| 231SM320-MA  | 1               | 226              | <b>320</b>   | 580 | 258 | 190 | 5         | 3 100                        | 5 200                          | 0,3                 | 2,26           | 3,37           | 2,21           |
| 222SM320-MA  | 1               | 249              | <b>320</b>   | 620 | 230 | 165 | 6         | 3 100                        | 4 750                          | 0,24                | 2,76           | 4,11           | 2,7            |
| 230S.1300    | 1               | 165              | <b>330,2</b> | 540 | 205 | 134 | 5         | 2 360                        | 4 150                          | 0,22                | 3,01           | 4,48           | 2,94           |
| 231S.1300    | 1               | 288              | <b>330,2</b> | 600 | 270 | 192 | 5         | 3 900                        | 6 800                          | 0,3                 | 2,25           | 3,34           | 2,2            |
| 230SM340-MA  | 1               | 157              | <b>340</b>   | 540 | 205 | 134 | 5         | 2 360                        | 4 150                          | 0,22                | 3,01           | 4,48           | 2,94           |
| Z-541423.PRL | 2               | 170              | <b>340</b>   | 560 | 205 | 133 | 5         | 2 450                        | 4 300                          | 0,22                | 3,01           | 4,48           | 2,94           |
| 231SM340-MA  | 1               | 314              | <b>340</b>   | 600 | 270 | 192 | 5         | 3 900                        | 6 800                          | 0,3                 | 2,25           | 3,34           | 2,2            |
| 222SM340-MA  | 1               | 276              | <b>340</b>   | 650 | 240 | 170 | 6         | 3 450                        | 5 100                          | 0,25                | 2,69           | 4              | 2,63           |
| 230S.1400    | 1               | 158              | <b>355,6</b> | 560 | 218 | 135 | 5         | 2 550                        | 4 650                          | 0,22                | 3,1            | 4,62           | 3,03           |
| 231S.1400    | 1               | 273              | <b>355,6</b> | 620 | 270 | 194 | 5         | 3 900                        | 6 950                          | 0,3                 | 2,28           | 3,39           | 2,23           |
| 230SM360-MA  | 1               | 154              | <b>360</b>   | 560 | 218 | 135 | 5         | 2 550                        | 4 650                          | 0,22                | 3,1            | 4,62           | 3,03           |
| 231SM360-MA  | 1               | 292              | <b>360</b>   | 620 | 270 | 194 | 5         | 3 900                        | 6 950                          | 0,3                 | 2,28           | 3,39           | 2,23           |
| Z-549160.PRL | 2               | 355              | <b>360</b>   | 620 | 298 | 194 | 5         | 3 650                        | 7 100                          | 0,32                | 2,12           | 3,15           | 2,07           |
| Z-535588.PRL | 2               | 150              | <b>380</b>   | 560 | 200 | 135 | 6         | 2 450                        | 4 900                          | 0,24                | 2,84           | 4,23           | 2,78           |
| Z-538301.PRL | 2               | 132              | <b>380</b>   | 560 | 205 | 135 | 5         | 2 450                        | 4 900                          | 0,24                | 2,84           | 4,23           | 2,78           |
| Z-544969.PRL | 1 <sup>1)</sup> | 157              | <b>380</b>   | 585 | 216 | 135 | 5         | 2 280                        | 4 550                          | 0,24                | 2,84           | 4,23           | 2,78           |
| 230SM380-MA  | 1               | 204              | <b>380</b>   | 600 | 225 | 148 | 5         | 2 700                        | 5 100                          | 0,21                | 3,2            | 4,77           | 3,13           |
| 231SM380-MA  | 1               | 326              | <b>380</b>   | 650 | 270 | 200 | 6         | 4 050                        | 7 200                          | 0,28                | 2,39           | 3,56           | 2,34           |
| Z-540759.PRL | 2               | 424              | <b>380</b>   | 680 | 340 | 240 | 8         | 5 100                        | 9 300                          | 0,37                | 1,8            | 2,69           | 1,76           |

1) With central rib.

2) For inner rings without axial abutment.

3) The bearings will also fit in housings from other manufacturers if the internal dimensions are identical.



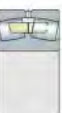
Locating bearings  
S30

① Split bearing, ② unsplit bearing

Locating bearings  
SD

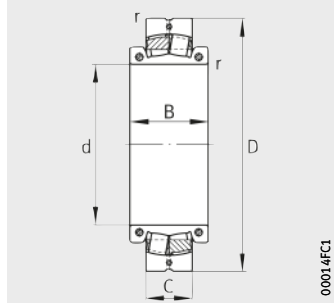
Non-locating bearings  
SAF and SDAF

| Fatigue limit load<br>$C_{ur}$<br>kN | Permissible axial load <sup>2)</sup><br>$F_a$ max.<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Tightening torque for screws |             | Possible replacement for unsplit spherical roller bearing with adapter sleeve |                |                | Suitable plummer block housing <sup>3)</sup> |
|--------------------------------------|--|--|------------------------------|-------------|---|----------------|----------------|--|
|                                      |  |  | $M_i$<br>Nm                  | $M_a$<br>Nm | Bearing   | Adapter sleeve | Adapter sleeve |  |
| 315                                  | –  | –  | –                            | –           | –   | –              | –              | –  |
| 227                                  | –  | –  | –                            | –           | –   | –              | –              | –  |
| 228                                  | 32   | 480  | 120                          | 69          | 23060K  | H3060          | –              | S3060K                                       |
| 265                                  | 44   | 400  | 190                          | 120         | 23160K  | H3160HG        | –              | SD3160TS                                     |
| 212                                  | 60   | 430  | 295                          | 120         | 22260K  | H3160HG        | –              | SD560  |
| 255                                  | –  | –  | –                            | –           | –   | –              | –              | –  |
| 255                                  | 32   | 430  | 120                          | 69          | 23064K  | H3064HG        | –              | S3064K                                       |
| 198                                  | –  | –  | 295                          | –           | –   | –              | –              | –  |
| 305                                  | 60   | 360  | 295                          | 120         | 23164K  | H3164HG        | –              | SD3164TS                                     |
| 228                                  | 60   | 380  | 295                          | 120         | 22264K  | H3164HG        | –              | SD564  |
| 255                                  | 32   | 430  | 120                          | 69          | 23064K  | SNP3064.1200   | H3064HGX1200   | SDAF064K/12                                  |
| 305                                  | 60   | 360  | 295                          | 120         | 23164K  | SNP3164.1200   | H3164HGX1200   | SDAF3164K/12                                 |
| 285                                  | 60   | 430  | 295                          | 69          | 23068K  | H3068HG        | –              | S3068K                                       |
| 270                                  | –  | –  | –                            | –           | –   | –              | –              | –  |
| 325                                  | 60   | 340  | 295                          | 190         | 23168K  | H3168HG        | –              | SD3168TS                                     |
| 270                                  | 60   | 360  | 295                          | 120         | 22268K  | H3168HG        | –              | –  |
| 315                                  | 60   | 380  | 295                          | 69          | 23072K  | SNP3072.1300   | H3072HGX1300   | SDAF072K/13                                  |
| 410                                  | 60   | 300  | 295                          | 35          | 23172K  | SNP3172.1300   | H3172HGX1300   | SDAF3172K/13                                 |
| 315                                  | 60   | 380  | 295                          | 69          | 23072K  | H3072HG        | –              | S3072K                                       |
| 315                                  | 60   | –  | 295                          | 120         | –   | –              | –              | –  |
| 410                                  | 60   | 300  | 295                          | 35          | 23172K  | H3172HG        | –              | SD3172TS                                     |
| 280                                  | 60   | 340  | 295                          | 120         | 22272K  | H3172HG        | –              | –  |
| 350                                  | 60   | 380  | 295                          | 69          | 23076K  | SNP3076.1400   | H3076HGX1400   | SDAF076K/14                                  |
| 420                                  | 60   | 300  | 295                          | 69          | 23176K  | SNP3176.1400   | H3176HGX1400   | SDAF3176K/14                                 |
| 350                                  | 60   | 380  | 295                          | 69          | 23076K  | H3076HG        | –              | S3076K                                       |
| 420                                  | 60   | 300  | 295                          | 69          | 23176K  | H3176HG        | –              | SD3176TS                                     |
| 425                                  | –  | –  | –                            | –           | –   | –              | –              | –  |
| 400                                  | –  | –  | –                            | –           | –   | –              | –              | –  |
| 400                                  | –  | –  | –                            | –           | –   | –              | –              | –  |
| 375                                  | –  | –  | –                            | –           | –   | –              | –              | –  |
| 350                                  | 60   | 380  | 295                          | 120         | 23080K  | H3080HG        | –              | S3080K                                       |
| 440                                  | 60   | 300  | 295                          | 120         | 23180K  | H3180HG        | –              | SD3180TS                                     |
| 740                                  | –  | –  | –                            | –           | –   | –              | –              | –  |

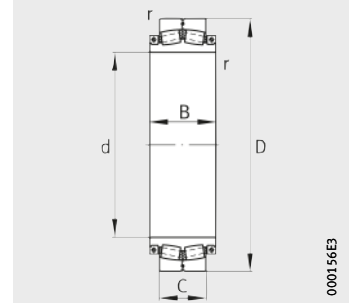


# Spherical roller bearings

## Split



Design 1  
Inner ring without central rib



Design 2  
Inner ring with three rigid ribs,  
separate locking rings

Dimension table (continued) · Dimensions in mm

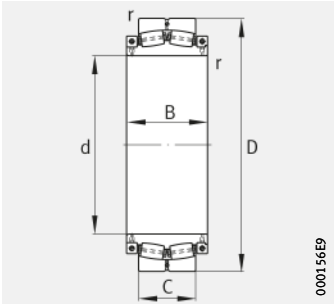
| Designation         | Design          | Mass<br>m<br>≈kg | Dimensions   |     |     |     |           | Basic load ratings           |                                | Calculation factors |                |                |                |
|---------------------|-----------------|------------------|--------------|-----|-----|-----|-----------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|
|                     |                 |                  | d            | D   | B   | C   | r<br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> |
| <b>230S.1500</b>    | 1               | 192              | <b>381</b>   | 600 | 225 | 148 | 5         | 2 700                        | 5 100                          | 0,21                | 3,2            | 4,77           | 3,13           |
| <b>231S.1500</b>    | 1               | 296              | <b>381</b>   | 650 | 270 | 200 | 6         | 4 050                        | 7 200                          | 0,28                | 2,39           | 3,56           | 2,34           |
| <b>Z-561566.PRL</b> | 2 <sup>1)</sup> | 430              | <b>381</b>   | 650 | 300 | 200 | 6         | 4 400                        | 7 800                          | 0,28                | 2,43           | 3,61           | 2,37           |
| <b>Z-524883.PRL</b> | 2               | 170              | <b>400</b>   | 600 | 235 | 148 | 5         | 2 800                        | 5 600                          | 0,24                | 2,79           | 4,15           | 2,73           |
| <b>230SM400-MA</b>  | 1               | 214              | <b>400</b>   | 620 | 225 | 150 | 5         | 3 100                        | 5 700                          | 0,22                | 3,1            | 4,62           | 3,03           |
| <b>240SM400-MA</b>  | 2               | 313              | <b>400</b>   | 620 | 290 | 200 | 5         | 3 750                        | 8 000                          | 0,32                | 2,13           | 3,17           | 2,08           |
| <b>231SM400-MA</b>  | 1               | 371              | <b>400</b>   | 700 | 285 | 224 | 6         | 4 400                        | 7 650                          | 0,28                | 2,39           | 3,56           | 2,34           |
| <b>230S.1600</b>    | 1               | 225              | <b>406,4</b> | 650 | 225 | 157 | 5         | 3 100                        | 5 850                          | 0,21                | 3,2            | 4,77           | 3,13           |
| <b>231S.1600</b>    | 2               | 547              | <b>406,4</b> | 720 | 315 | 226 | 6         | 5 400                        | 9 650                          | 0,29                | 2,3            | 3,42           | 2,25           |
| <b>230SM410-MA</b>  | 1               | 222              | <b>410</b>   | 650 | 225 | 157 | 5         | 3 100                        | 5 850                          | 0,21                | 3,2            | 4,77           | 3,13           |
| <b>231SM410-MA</b>  | 2               | 566              | <b>410</b>   | 720 | 315 | 226 | 6         | 5 400                        | 9 650                          | 0,29                | 2,3            | 3,42           | 2,25           |
| <b>Z-536955.PRL</b> | 2               | 204              | <b>420</b>   | 620 | 238 | 150 | 5         | 2 800                        | 5 700                          | 0,24                | 2,84           | 4,23           | 2,78           |
| <b>230SM420-MA</b>  | 1               | 246              | <b>420</b>   | 650 | 235 | 157 | 5         | 3 100                        | 5 850                          | 0,21                | 3,2            | 4,77           | 3,13           |
| <b>231SM430-MA</b>  | 2               | 624              | <b>430</b>   | 760 | 344 | 240 | 6         | 5 500                        | 10 400                         | 0,29                | 2,33           | 3,47           | 2,28           |
| <b>Z-542118.PRL</b> | 3               | 610              | <b>430</b>   | 760 | 344 | 240 | 6         | 6 100                        | 12 700                         | 0,32                | 2,12           | 3,15           | 2,07           |
| <b>Z-537162.PRL</b> | 2               | 295              | <b>440</b>   | 650 | 248 | 157 | 6         | 3 150                        | 6 300                          | 0,24                | 2,84           | 4,23           | 2,78           |
| <b>230SM450-MA</b>  | 2               | 291              | <b>450</b>   | 700 | 245 | 165 | 6         | 3 650                        | 6 950                          | 0,21                | 3,2            | 4,77           | 3,13           |
| <b>Z-529173.PRL</b> | 3               | 265              | <b>470</b>   | 670 | 250 | 170 | 5         | 3 350                        | 7 500                          | 0,22                | 3,07           | 4,57           | 3              |
| <b>230SM470-MA</b>  | 2               | 354              | <b>470</b>   | 720 | 260 | 167 | 6         | 3 600                        | 7 500                          | 0,23                | 2,9            | 4,31           | 2,83           |
| <b>Z-538297.PRL</b> | 2               | 319              | <b>470</b>   | 720 | 260 | 167 | 6         | 3 650                        | 7 650                          | 0,22                | 3,01           | 4,48           | 2,94           |
| <b>241SM470-MA</b>  | 2               | 872              | <b>470</b>   | 830 | 420 | 325 | 7,5       | 7 800                        | 16 000                         | 0,39                | 1,75           | 2,61           | 1,71           |
| <b>Z-547397.PRL</b> | 2               | 355              | <b>480</b>   | 700 | 324 | 218 | 6         | 4 300                        | 9 500                          | 0,3                 | 2,25           | 3,34           | 2,2            |
| <b>Z-537276.PRL</b> | 3               | 225              | <b>500</b>   | 670 | 250 | 170 | 5         | 3 250                        | 7 800                          | 0,22                | 3,14           | 4,67           | 3,07           |
| <b>Z-528441.PRL</b> | 3               | 310              | <b>500</b>   | 710 | 260 | 180 | 5         | 3 650                        | 8 800                          | 0,22                | 3,01           | 4,48           | 2,94           |
| <b>Z-548411.PRL</b> | 2               | 295              | <b>500</b>   | 720 | 264 | 167 | 6         | 3 650                        | 7 650                          | 0,22                | 3,01           | 4,48           | 2,94           |
| <b>230SM500-MA</b>  | 2               | 475              | <b>500</b>   | 780 | 270 | 185 | 6         | 4 150                        | 8 500                          | 0,2                 | 3,34           | 4,98           | 3,27           |
| <b>241SM500-MA</b>  | 2               | 1 100            | <b>500</b>   | 870 | 450 | 335 | 7,5       | 8 500                        | 17 600                         | 0,39                | 1,73           | 2,58           | 1,69           |

1) Without central rib.

2) For inner rings without axial abutment.

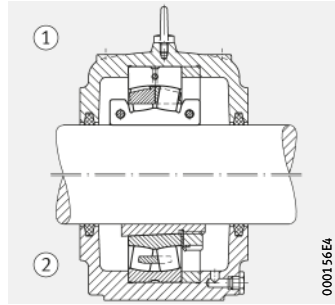
3) The bearings will also fit in housings from other manufacturers if the internal dimensions are identical.

4) Withdrawal sleeve.



Design 3  
With pin cage

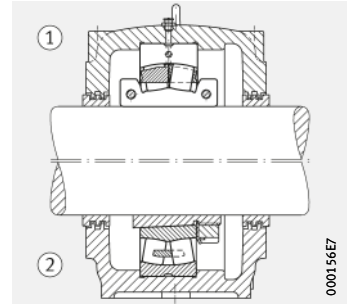
000156E9



Locating bearings  
S30

① Split bearing, ② unsplit bearing

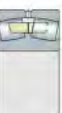
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Locating bearings  
SD

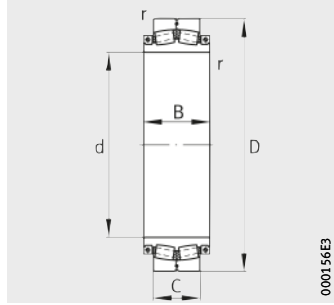
000156E7

| Fatigue limit load<br>$C_{ur}$<br>kN | Permissible axial load <sup>2)</sup><br>$F_a$ max.<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Tightening torque for screws |             | Possible replacement for unsplit spherical roller bearing with adapter sleeve |                         |                | Suitable plummer block housing <sup>3)</sup> |
|--------------------------------------|--|--|------------------------------|-------------|---|-------------------------|----------------|--|
|                                      |  |  | $M_i$<br>Nm                  | $M_a$<br>Nm | Bearing   | Adapter sleeve          | Adapter sleeve |  |
| 350                                  | 60   | 380  | 295                          | 120         | 23080K  | SNP3080.1500            | SNP3080X1500   | SDAF080K/15                                  |
| 440                                  | 60   | 300  | 295                          | 120         | 23180K  | SNP3180.1500            | H3180HGX1500   | SDAF3180K/15                                 |
| 480                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 325                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 420                                  | 60   | 340  | 295                          | 69          | 23084K  | H3084XHG                | –              | S3084K                                       |
| 630                                  | 60   | 190  | 295                          | 69          | –   | –                       | –              | –  |
| 480                                  | 60   | 280  | 295                          | 190         | 23184K  | H3184HG                 | –              | SD3184TS                                     |
| 425                                  | 60   | 340  | 295                          | 120         | 23088K  | SNP3088.1600            | SNP3088X1600   | SDAF088K/16                                  |
| 570                                  | 94   | 260  | 580                          | 120         | 23188K  | SNP3188.1600            | H3188HGX1600   | SDAF3188K/16                                 |
| 425                                  | 60   | 340  | 295                          | 120         | 23088K  | H3088HG                 | –              | S3088K                                       |
| 570                                  | 60   | 260  | 295                          | 120         | 23188K  | H3188HG                 | –              | SD3188TS                                     |
| 450                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 425                                  | 60,5   | 340  | 295                          | 120         | 23088K  | AHX3088GH <sup>4)</sup> | –              | –  |
| 600                                  | 94,2   | 300  | 580                          | 295         | 23192K  | H3192HG                 | –              | –  |
| 730                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 450                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 495                                  | 60   | 300  | 190                          | 190         | 23096K  | H3096HG                 | –              | S3096K                                       |
| –                                    | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 425                                  | 60   | 190  | 295                          | 120         | 230/500K  | H30/500HG               | –              | –  |
| 540                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 1140                                 | 60   | 156  | 1000                         | 295         | 241/500K30  | H241/500HG              | –              | –  |
| 720                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 530                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| –                                    | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 580                                  | –  | –  | –                            | –           | –   | –                       | –              | –  |
| 580                                  | 60   | 300  | 295                          | 120         | 230/530K  | H30/530HG               | –              | –  |
| 1280                                 | 60   | 148  | 1000                         | 295         | 241/530K30  | H241/530HG              | –              | –  |

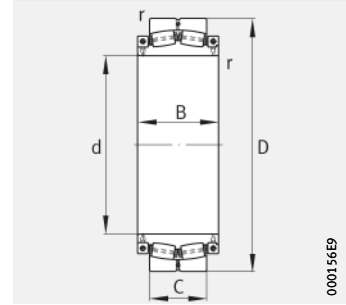


# Spherical roller bearings

## Split



Design 2  
Inner ring with three rigid ribs,  
separate locking rings



Design 3  
With pin cage

Dimension table (continued) · Dimensions in mm

| Designation     | Design | Mass<br>m<br>≈kg | Dimensions |       |     |     |           | Basic load ratings           |                                | Calculation factors |                |                |                |
|-----------------|--------|------------------|------------|-------|-----|-----|-----------|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|
|                 |        |                  | d          | D     | B   | C   | r<br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> |
| Z-537277.PRL    | 3      | 264              | 530        | 710   | 260 | 180 | 5         | 3 650                        | 8 800                          | 0,22                | 3,14           | 4,67           | 3,07           |
| 239SM530-MA     | 2      | 293              | 530        | 750   | 225 | 140 | 5         | 2 750                        | 6 550                          | 0,18                | 3,85           | 5,73           | 3,76           |
| Z-529223.PRL    | 3      | 355              | 530        | 750   | 270 | 190 | 5         | 4 250                        | 9 650                          | 0,22                | 3,01           | 4,48           | 2,94           |
| Z-532948.01.PRL | 2      | 400              | 530        | 750   | 300 | 190 | 6         | 3 800                        | 8 500                          | 0,23                | 2,9            | 4,31           | 2,83           |
| Z-548412.PRL    | 2      | 400              | 530        | 780   | 272 | 185 | 6         | 4 000                        | 8 300                          | 0,22                | 3,04           | 4,53           | 2,97           |
| 230SM530-MA     | 2      | 555              | 530        | 820   | 300 | 195 | 6         | 4 650                        | 9 650                          | 0,23                | 2,95           | 4,4            | 2,89           |
| 241SM530-MA     | 2      | 1 360            | 530        | 920   | 500 | 355 | 7,5       | 9 150                        | 19 300                         | 0,38                | 1,77           | 2,64           | 1,73           |
| Z-537278.PRL    | 3      | 305              | 560        | 750   | 270 | 190 | 5         | 4 150                        | 10 400                         | 0,22                | 3,14           | 4,67           | 3,07           |
| 239SM560-MA     | 2      | 356              | 560        | 800   | 235 | 150 | 5         | 2 900                        | 7 100                          | 0,17                | 3,95           | 5,88           | 3,86           |
| Z-548413.PRL    | 2      | 420              | 560        | 820   | 300 | 195 | 6         | 4 650                        | 9 650                          | 0,23                | 2,95           | 4,4            | 2,89           |
| Z-529224.PRL    | 3      | 410              | 570        | 800   | 290 | 200 | 5         | 4 650                        | 10 800                         | 0,22                | 3,01           | 4,48           | 2,94           |
| Z-512111.PRL    | 3      | 600              | 599,45     | 870   | 335 | 215 | 6         | 5 700                        | 12 500                         | 0,22                | 3,07           | 4,57           | 3              |
| Z-547304.PRL    | 2      | 260              | 600        | 800   | 238 | 150 | 5         | 3 350                        | 8 150                          | 0,17                | 3,95           | 5,88           | 3,86           |
| Z-533761.PRL    | 3      | 377              | 600        | 800   | 290 | 200 | 6         | 4 550                        | 11 600                         | 0,21                | 3,2            | 4,77           | 3,13           |
| 239SM600-MA     | 2      | 410              | 600        | 850   | 250 | 165 | 5         | 3 900                        | 8 800                          | 0,18                | 3,66           | 5,46           | 3,58           |
| Z-529225.PRL    | 3      | 525              | 600        | 850   | 310 | 218 | 6         | 5 300                        | 12 500                         | 0,23                | 2,95           | 4,4            | 2,89           |
| Z-538376.PRL    | 2      | 850              | 600        | 920   | 410 | 290 | 6         | 8 000                        | 17 000                         | 0,31                | 2,21           | 3,29           | 2,16           |
| Z-539466.PRL    | 3      | 385              | 630        | 850   | 250 | 165 | 6         | 4 300                        | 10 600                         | 0,18                | 3,8            | 5,66           | 3,72           |
| Z-537279.PRL    | 3      | 460              | 630        | 850   | 310 | 218 | 6         | 5 400                        | 13 700                         | 0,22                | 3,07           | 4,57           | 3              |
| Z-529226.PRL    | 3      | 630              | 630        | 900   | 330 | 230 | 6         | 5 850                        | 13 400                         | 0,23                | 2,95           | 4,4            | 2,89           |
| 230SM630-MA     | 2      | 955              | 630        | 980   | 355 | 230 | 7,5       | 6 400                        | 13 700                         | 0,22                | 3,01           | 4,48           | 2,94           |
| Z-561196.PRL    | 2      | 1 090            | 630        | 980   | 430 | 308 | 7,5       | 8 800                        | 17 600                         | 0,3                 | 2,28           | 3,39           | 2,23           |
| Z-537280.PRL    | 3      | 528              | 670        | 900   | 325 | 230 | 7,5       | 6 000                        | 15 300                         | 0,22                | 3,1            | 4,62           | 3,03           |
| Z-529227.PRL    | 3      | 740              | 670        | 950   | 350 | 243 | 6         | 6 550                        | 15 600                         | 0,22                | 3,01           | 4,48           | 2,94           |
| Z-535551.PRL    | 2      | 790              | 670        | 980   | 345 | 230 | 7,5       | 6 800                        | 14 600                         | 0,22                | 3,01           | 4,48           | 2,94           |
| Z-546079.PRL    | 3      | 1 650            | 670        | 1 150 | 500 | 345 | 7,5       | 12 900                       | 28 000                         | 0,3                 | 2,25           | 3,34           | 2,2            |
| Z-547305.PRL    | 2      | 1 280            | 700        | 1 030 | 465 | 315 | 7,5       | 8 650                        | 20 000                         | 0,3                 | 2,26           | 3,37           | 2,21           |
| Z-526073.PRL    | 3      | 570              | 710        | 950   | 350 | 243 | 7,5       | 6 550                        | 16 600                         | 0,22                | 3,14           | 4,67           | 3,07           |
| Z-527943.PRL    | 3      | 850              | 710        | 1 000 | 360 | 250 | 6         | 7 350                        | 17 600                         | 0,21                | 3,2            | 4,77           | 3,13           |
| Z-533414.PRL    | 3      | 707              | 750        | 1 000 | 355 | 250 | 7,5       | 7 500                        | 19 600                         | 0,22                | 3,07           | 4,57           | 3              |
| Z-533414.01.PRL | 3      | 707              | 750        | 1 000 | 355 | 250 | 7,5       | 7 500                        | 19 600                         | 0,22                | 3,07           | 4,57           | 3              |
| Z-529228.PRL    | 3      | 950              | 750        | 1 060 | 370 | 258 | 6         | 7 800                        | 19 300                         | 0,22                | 3,07           | 4,57           | 3              |
| Z-547360.PRL    | 2      | 1 400            | 750        | 1 090 | 500 | 335 | 7,5       | 9 650                        | 22 800                         | 0,31                | 2,15           | 3,2            | 2,1            |
| Z-549640.PRL    | 2      | 888              | 750        | 1 150 | 398 | 258 | 7,5       | 8 650                        | 19 000                         | 0,22                | 3,07           | 4,57           | 3              |

<sup>1)</sup> For inner rings without axial abutment.

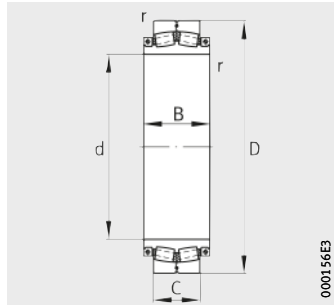


| Fatigue limit load<br><br>$C_{ur}$<br>kN | Permissible axial load <sup>1)</sup><br><br>$F_a$ max.<br>kN | Limiting speed<br><br>$n_G$<br>min <sup>-1</sup> | Tightening torque for screws |             | Possible replacement for unsplit spherical roller bearing with adapter sleeve |                |
|--|--|--|------------------------------|-------------|---|----------------|
|  |  |  | $M_i$<br>Nm                  | $M_a$<br>Nm | Bearing   | Adapter sleeve |
| 410                                      | –  | –  | –                            | –           | –   | –              |
| 365                                      | 60   | 170  | 295                          | 69          | 239/560K  | H39/560HG      |
| –  | –  | –  | –                            | –           | –   | –              |
| 630                                      | –  | –  | –                            | –           | –   | –              |
| 570                                      | –  | –  | –                            | –           | –   | –              |
| 700                                      | 94,2   | 160  | 580                          | 120         | 230/560K  | H30/560HG      |
| 1 390                                    | 135,3  | 140  | 2 000                        | 295         | 241/560K30  | H241/560HG     |
| 670                                      | –  | –  | –                            | –           | –   | –              |
| 530                                      | 60   | 170  | 295                          | 69          | 239/600K  | H39/600HG      |
| 700                                      | –  | –  | –                            | –           | –   | –              |
| –  | –  | –  | –                            | –           | –   | –              |
| 840                                      | –  | –  | –                            | –           | –   | –              |
| 600                                      | –  | –  | –                            | –           | –   | –              |
| 475                                      | 60   | –  | –                            | –           | –   | –              |
| 540                                      | 60   | 160  | 295                          | 69          | 239/630K  | H39/630HG      |
| –  | –  | –  | –                            | –           | –   | –              |
| 1 110                                    | –  | –  | –                            | –           | –   | –              |
| 770                                      | –  | –  | –                            | –           | –   | –              |
| 840                                      | –  | –  | –                            | –           | –   | –              |
| –  | –  | –  | –                            | –           | –   | –              |
| 950                                      | 94,2   | 160  | 1 000                        | 120         | 230/670K  | H30/670HG      |
| 1 160                                    | –  | –  | –                            | –           | –   | –              |
| 680                                      | 94   | –  | –                            | –           | –   | –              |
| –  | –  | –  | –                            | –           | –   | –              |
| 1 020                                    | –  | –  | –                            | –           | –   | –              |
| 1 830                                    | –  | –  | –                            | –           | –   | –              |
| 1 340                                    | –  | –  | –                            | –           | –   | –              |
| 570                                      | –  | –  | –                            | –           | –   | –              |
| –  | –  | –  | –                            | –           | –   | –              |
| 760                                      | 118  | –  | –                            | –           | –   | –              |
| 760                                      | 118  | –  | –                            | –           | –   | –              |
| –  | –  | –  | –                            | –           | –   | –              |
| 1 490                                    | –  | –  | –                            | –           | –   | –              |
| 1 220                                    | –  | –  | –                            | –           | –   | –              |

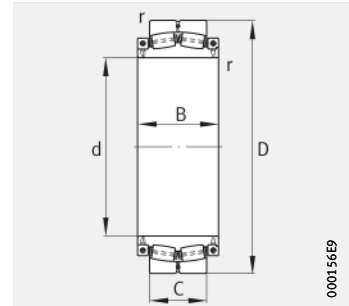


# Spherical roller bearings

Split



Design 2  
Inner ring with three rigid ribs,  
separate locking rings



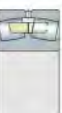
Design 3  
With pin cage

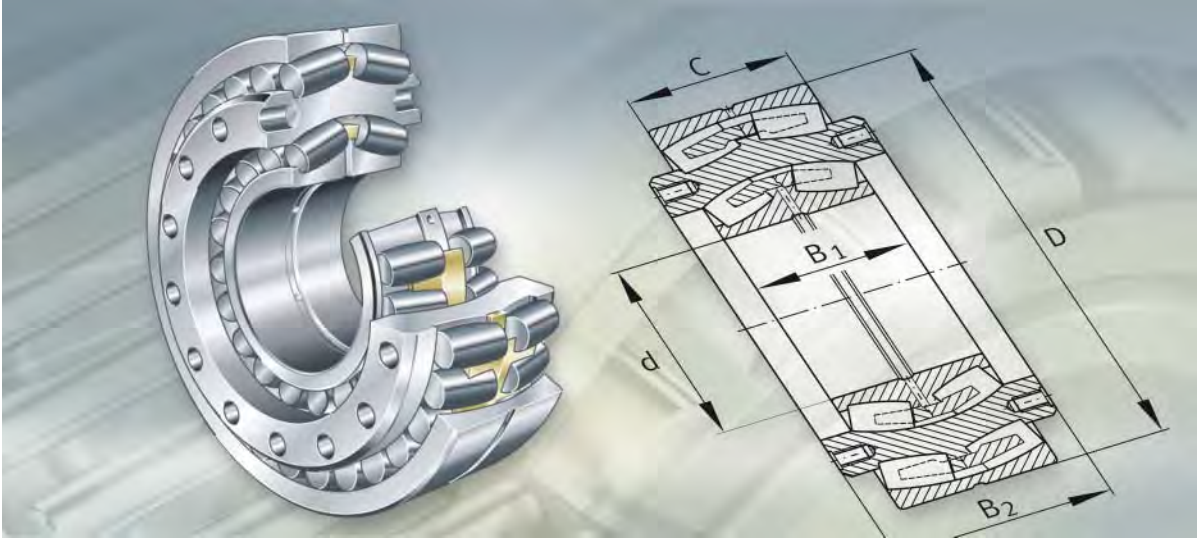
Dimension table (continued) · Dimensions in mm

| Designation     | Design | Mass<br>m<br>≈kg | Dimensions   |       |     |     |           |
|-----------------|--------|------------------|--------------|-------|-----|-----|-----------|
|                 |        |                  | d            | D     | B   | C   | r<br>min. |
| Z-538984.PRL    | 2      | 1 080            | <b>777</b>   | 1 110 | 320 | 207 | 7,5       |
| Z-532063.PRL    | 3      | 840              | <b>800</b>   | 1 060 | 370 | 258 | 7,5       |
| Z-529229.PRL    | 3      | 1 100            | <b>800</b>   | 1 120 | 390 | 272 | 6         |
| Z-549639.PRL    | 2      | 1 170            | <b>800</b>   | 1 150 | 398 | 258 | 7,5       |
| Z-548414.PRL    | 2      | 1 210            | <b>800</b>   | 1 150 | 412 | 258 | 7,5       |
| Z-537281.PRL    | 3      | 1 030            | <b>850</b>   | 1 120 | 385 | 272 | 6         |
| Z-529230.PRL    | 3      | 1 250            | <b>850</b>   | 1 180 | 400 | 280 | 6         |
| Z-511962.01.PRL | 3      | 1 500            | <b>850</b>   | 1 220 | 445 | 287 | 7,5       |
| Z-547266.PRL    | 2      | 1 900            | <b>850</b>   | 1 220 | 540 | 365 | 7,5       |
| Z-513411.PRL    | 3      | 1 620            | <b>850</b>   | 1 280 | 480 | 300 | 7,5       |
| Z-523269.PRL    | 3      | 1 990            | <b>850</b>   | 1 280 | 480 | 310 | 7,5       |
| Z-522013.PRL    | 3      | 2 030            | <b>850</b>   | 1 280 | 540 | 375 | 7,5       |
| Z-542824.PRL    | 2      | 663              | <b>900</b>   | 1 180 | 300 | 206 | 6         |
| Z-537282.PRL    | 3      | 1 050            | <b>900</b>   | 1 180 | 390 | 280 | 6         |
| Z-527254.PRL    | 3      | 1 490            | <b>900</b>   | 1 250 | 420 | 300 | 7,5       |
| Z-517015.PRL    | 3      | 2 290            | <b>900</b>   | 1 360 | 490 | 330 | 7,5       |
| Z-537240.PRL    | 2      | 439              | <b>950</b>   | 1 150 | 235 | 150 | 6         |
| Z-534826.PRL    | 3      | 1 270            | <b>950</b>   | 1 250 | 410 | 300 | 7,5       |
| Z-529231.PRL    | 3      | 1 800            | <b>950</b>   | 1 320 | 460 | 315 | 7,5       |
| Z-517972.PRL    | 3      | 2 880            | <b>950</b>   | 1 420 | 585 | 412 | 7,5       |
| Z-533567.PRL    | 3      | 1 565            | <b>1 000</b> | 1 320 | 450 | 315 | 7,5       |
| Z-529232.PRL    | 3      | 2 180            | <b>1 000</b> | 1 400 | 490 | 335 | 7,5       |
| Z-510504.PRL    | 3      | 2 690            | <b>1 000</b> | 1 470 | 530 | 345 | 7,5       |
| Z-521868.PRL    | 3      | 2 880            | <b>1 000</b> | 1 520 | 475 | 315 | 7,5       |
| Z-537283.PRL    | 3      | 1 750            | <b>1 060</b> | 1 400 | 475 | 335 | 7,5       |
| Z-529233.01.PRL | 3      | 2 300            | <b>1 060</b> | 1 460 | 490 | 335 | 7,5       |
| Z-537284.PRL    | 3      | 1 930            | <b>1 120</b> | 1 460 | 475 | 335 | 7,5       |
| Z-529234.PRL    | 3      | 2 650            | <b>1 120</b> | 1 540 | 520 | 355 | 7,5       |
| Z-536806.PRL    | 3      | 2 280            | <b>1 180</b> | 1 540 | 500 | 355 | 7,5       |
| Z-537285.PRL    | 3      | 2 800            | <b>1 250</b> | 1 630 | 545 | 375 | 7,5       |
| Z-529215.PRL    | 3      | 3 800            | <b>1 250</b> | 1 720 | 580 | 400 | 7,5       |
| Z-545161.PRL    | 3      | 3 300            | <b>1 320</b> | 1 720 | 580 | 400 | 7,5       |

1) For inner rings without axial abutment.

| Basic load ratings           |                                | Calculation factors |                |                |                | Fatigue limit load    | Permissible axial load <sup>1)</sup> |
|------------------------------|--------------------------------|---------------------|----------------|----------------|----------------|-----------------------|--------------------------------------|
| dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | e                   | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>0</sub> | C <sub>ur</sub><br>kN | F <sub>a</sub><br>max.<br>kN         |
| 6 550                        | 14 600                         | 0,18                | 3,76           | 5,59           | 3,67           | 1 040                 | –                                    |
| 7 650                        | 20 400                         | 0,2                 | 3,31           | 4,92           | 3,23           | 1 210                 | –                                    |
| 8 650                        | 20 800                         | 0,22                | 3,14           | 4,67           | 3,07           | –                     | –                                    |
| 8 650                        | 19 000                         | 0,22                | 3,07           | 4,57           | 3              | 1 220                 | –                                    |
| 8 150                        | 17 600                         | 0,22                | 3,07           | 4,57           | 3              | 1 130                 | –                                    |
| 8 300                        | 22 400                         | 0,21                | 3,27           | 4,87           | 3,2            | 740                   | 135,3                                |
| 9 300                        | 23 600                         | 0,21                | 3,2            | 4,77           | 3,13           | –                     | –                                    |
| 10 600                       | 24 500                         | 0,22                | 3,07           | 4,57           | 3              | 1 530                 | –                                    |
| 11 800                       | 29 000                         | 0,29                | 2,33           | 3,47           | 2,28           | 1 860                 | –                                    |
| 11 600                       | 25 500                         | 0,22                | 3,14           | 4,67           | 3,07           | 1 610                 | –                                    |
| 11 600                       | 25 500                         | 0,22                | 3,14           | 4,67           | 3,07           | 1 610                 | –                                    |
| 14 000                       | 33 500                         | 0,26                | 2,55           | 3,8            | 2,5            | 1 380                 | –                                    |
| 6 400                        | 16 600                         | 0,16                | 4,28           | 6,37           | 4,19           | 990                   | –                                    |
| 8 800                        | 24 000                         | 0,2                 | 3,38           | 5,03           | 3,3            | 1 000                 | –                                    |
| 10 400                       | 26 000                         | 0,21                | 3,2            | 4,77           | 3,13           | –                     | –                                    |
| 12 500                       | 28 500                         | 0,22                | 3,07           | 4,57           | 3              | 1 010                 | 318                                  |
| 3 800                        | 11 200                         | 0,11                | 6,06           | 9,02           | 5,92           | 680                   | –                                    |
| 10 400                       | 28 500                         | 0,2                 | 3,38           | 5,03           | 3,3            | 1 030                 | 135,3                                |
| 11 400                       | 29 000                         | 0,21                | 3,2            | 4,77           | 3,13           | 1 010                 | 216,9                                |
| 17 300                       | 41 500                         | 0,26                | 2,55           | 3,8            | 2,5            | 2 100                 | –                                    |
| 11 800                       | 32 500                         | 0,21                | 3,27           | 4,87           | 3,2            | 1 960                 | –                                    |
| 12 900                       | 33 500                         | 0,22                | 3,14           | 4,67           | 3,07           | 2 020                 | –                                    |
| 13 700                       | 32 000                         | 0,22                | 3,07           | 4,57           | 3              | 2 010                 | –                                    |
| 13 200                       | 31 500                         | 0,19                | 3,5            | 5,21           | 3,42           | 1 120                 | 318                                  |
| 12 700                       | 36 500                         | 0,2                 | 3,31           | 4,92           | 3,23           | 1 190                 | 216,9                                |
| 14 300                       | 41 500                         | 0,2                 | 3,38           | 5,03           | 3,3            | 1 300                 | –                                    |
| 12 900                       | 36 500                         | 0,19                | 3,58           | 5,33           | 3,5            | 2 050                 | –                                    |
| 13 900                       | 37 500                         | 0,2                 | 3,38           | 5,03           | 3,3            | 1 750                 | –                                    |
| 14 600                       | 41 500                         | 0,2                 | 3,42           | 5,09           | 3,34           | 1 480                 | –                                    |
| 16 000                       | 49 000                         | 0,19                | 3,5            | 5,21           | 3,42           | 1 490                 | 318                                  |
| 18 000                       | 49 000                         | 0,2                 | 3,42           | 5,09           | 3,34           | 2 900                 | –                                    |
| 17 300                       | 52 000                         | 0,19                | 3,54           | 5,27           | 3,46           | 1 750                 | –                                    |

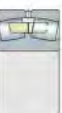




Triple ring bearings

# Triple ring bearings

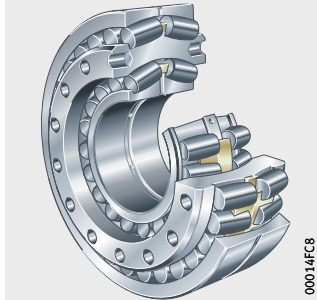
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# Product overview Triple ring bearings

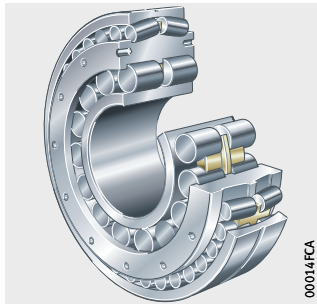
**Spherical roller bearings  
as inner and outer bearings  
(Beloit design)**

Z-5..04.DRGL-01



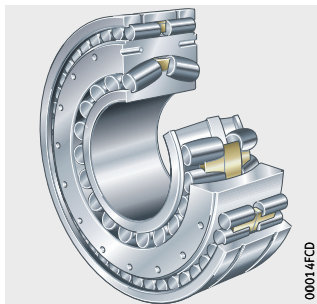
**Spherical roller bearing  
as outer bearing,  
cylindrical roller bearing  
as inner bearing  
(Küstners design)**

Z-5..04.DRGL-02



**Cylindrical roller bearing  
as outer bearing,  
spherical roller bearing  
as inner bearing  
(Farrel design)**

Z-5..04.DRGL-03



# Triple ring bearings

**Features** Triple ring bearings are special bearings for deflection compensating rolls in presses and calenders in paper machinery.

In these rolls, the roll sleeve rotates about the stationary roll axis. For driven rolls of older types, triple ring bearings are frequently used. The stationary axis is supported in the bearing interior. The rotating intermediate ring connects the drive to the roll sleeve. The intermediate ring has holes in both end faces so that it can be driven either directly or via a coupling. Depending on the type of deflection compensating roll, one of three bearing designs is used, *Figure 1*.

**Spherical roller bearings as inner and outer bearings**

Bearing design 1 with one spherical roller bearing each as the inner and outer bearing is also described as the Beloit design for CC rolls (controlled crown rolls).

**Spherical roller bearing as outer bearing, cylindrical roller bearing as inner bearing**

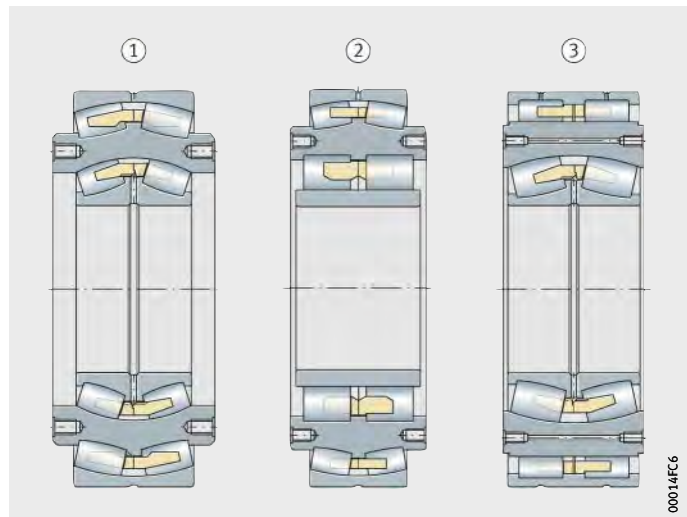
Design 2 has a double row cylindrical roller bearing as the inner bearing and a spherical roller bearing as the outer bearing. This is described as the Küsters design for S rolls (floating rolls).

**Spherical roller bearing as inner bearing, cylindrical roller bearing as outer bearing**

In this so-called Farrel design 3, a spherical roller bearing is used as the inner bearing and a double row cylindrical roller bearing as the outer bearing.

- ① Beloit design
- ② Küsters design
- ③ Farrel design

*Figure 1*  
Triple ring bearings are special bearings for deflection compensating rolls in presses and calenders in paper machinery



## Triple ring bearings

|                                       |   |
|---------------------------------------|---|
| <b>Radial and axial load capacity</b> | The spherical roller bearings can support axial loads in both directions and high radial loads. The designs with a cylindrical roller bearing allow axial displacements within the bearing. |
| <b>Material</b>                       | The inner rings, which are subjected to the very highest loads, are made from particularly clean rolling bearing steel (suffix 04).   |
| <b>Lubrication</b>                    | Triple ring bearings are lubricated with oil. The bearings have the necessary lubrication grooves and lubrication slots for reliable lubricant supply.                                      |
| <b>Operating temperature</b>          | Triple ring bearings are dimensionally stable up to +200 °C. Bearings with metal cages can be used at operating temperatures from -30 °C to +200 °C.  |
| <b>Cages</b>                          | Triple ring bearings are fitted with solid brass cages.   |



**Design and safety guidelines**  
**Equivalent dynamic bearing load**

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

**Load ratio and equivalent dynamic load**

For spherical roller bearings under dynamic loading, the following applies:

| Load ratio               | Equivalent dynamic load              |
|--------------------------|--------------------------------------|
| $\frac{F_a}{F_r} \leq e$ | $P = F_r + Y_1 \cdot F_a$            |
| $\frac{F_a}{F_r} > e$    | $P = 0,67 \cdot F_r + Y_2 \cdot F_a$ |

- P                            kN  
Equivalent dynamic bearing load for combined load
- $F_a$                         kN  
Axial dynamic bearing load
- $F_r$                         kN  
Radial dynamic bearing load
- $e, Y_1, Y_2$               –  
Factors, see dimension tables.

For cylindrical roller bearings under dynamic loading used as non-locating bearings, the following applies:

$P = F_r$

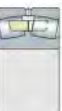
**Minimum radial load**

The minimum radial load on the triple ring bearings should be:

$P = 0,02 \cdot C_r$

**Design of bearing arrangements**  
**Shaft and housing tolerances**

The inner rings and outer rings of triple ring bearings do not rotate. A loose fit is therefore permissible on the shaft and in the housing.



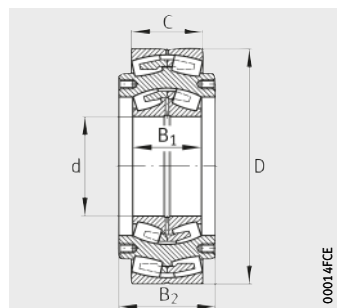
# Triple ring bearings

**Accuracy** Triple ring bearings have the normal tolerances used for unsplit radial bearings. The dimensional tolerances correspond to tolerance class PN to DIN 620-2. However, the running accuracy is normally higher.

The radial internal clearance of triple ring bearings generally corresponds to internal clearance group CN for bearings with a cylindrical bore (DIN 620-4).

# Triple ring bearings

Beloit design



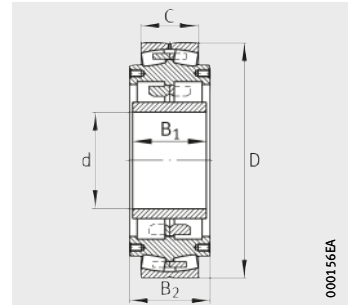
**Dimension table** · Dimensions in mm

| Designation             | Mass<br>m<br>≈kg | Dimensions |       |     |                |                | Basic load ratings                            |   | Fatigue limit load                     |  |
|-------------------------|------------------|------------|-------|-----|----------------|----------------|---|---|--|--|
|                         |                  | d          | D     | C   | B <sub>1</sub> | B <sub>2</sub> | dyn.<br>Inner bearing<br>C <sub>r</sub><br>kN | dyn.<br>Outer bearing<br>C <sub>r</sub><br>kN | Inner bearing<br>C <sub>ur</sub><br>kN | Outer bearing<br>C <sub>ur</sub><br>kN |
| <b>Z-525349.04.DRGL</b> | 177              | <b>180</b> | 480   | 160 | 140            | 215,9          | 1 470   | 2 600   | 158                                    | 360                                    |
| <b>Z-531033.04.DRGL</b> | 231              | <b>200</b> | 520   | 180 | 160            | 241,3          | 1 820   | 3 100   | 202                                    | 530                                    |
| <b>Z-527870.04.DRGL</b> | 356              | <b>220</b> | 600   | 200 | 180            | 279,4          | 2 240   | 3 900   | 233                                    | 670                                    |
| <b>Z-531040.04.DRGL</b> | 370              | <b>240</b> | 620   | 200 | 200            | 279,4          | 2 700   | 4 050   | 360                                    | 710                                    |
| <b>Z-522933.04.DRGL</b> | 498              | <b>260</b> | 680   | 218 | 218            | 317,5          | 3 250   | 4 750   | 485                                    | 710                                    |
| <b>Z-525350.04.DRGL</b> | 560              | <b>280</b> | 720   | 218 | 218            | 317,5          | 3 400   | 4 950   | 520                                    | 850                                    |
| <b>Z-522401.04.DRGL</b> | 750              | <b>300</b> | 780   | 250 | 243            | 342,9          | 4 050   | 5 900   | 550                                    | 910                                    |
| <b>Z-525351.04.DRGL</b> | 864              | <b>320</b> | 820   | 258 | 258            | 368,3          | 4 400   | 6 400   | 610                                    | 1 050                                  |
| <b>Z-522400.04.DRGL</b> | 1 020            | <b>340</b> | 870   | 272 | 280            | 393,7          | 5 500   | 7 100   | 820                                    | 1 200                                  |
| <b>Z-522934.04.DRGL</b> | 1 450            | <b>380</b> | 980   | 308 | 300            | 431,8          | 6 300   | 9 000   | 930                                    | 1 460                                  |
| <b>Z-563933.04.DRGL</b> | 1 650            | <b>400</b> | 1 030 | 315 | 315            | 444,5          | 7 000   | 9 600   | 960                                    | 1 550                                  |
| <b>Z-531796.04.DRGL</b> | 1 970            | <b>420</b> | 1 090 | 335 | 335            | 457,2          | 8 300   | 10 800  | 1 220                                  | 1 730                                  |



# Triple ring bearings

Küstners design

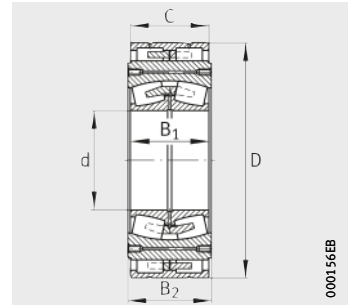


**Dimension table** - Dimensions in mm

| Designation      | Mass<br>m<br>≈kg | Dimensions |       |     |                |                | Basic load ratings                            |   | Fatigue limit load                     |  |
|------------------|------------------|------------|-------|-----|----------------|----------------|---|---|--|--|
|                  |                  | d          | D     | C   | B <sub>1</sub> | B <sub>2</sub> | dyn.<br>Inner bearing<br>C <sub>r</sub><br>kN | dyn.<br>Outer bearing<br>C <sub>r</sub><br>kN | Inner bearing<br>C <sub>ur</sub><br>kN | Outer bearing<br>C <sub>ur</sub><br>kN |
| Z-531151.04.DRGL | 58               | <b>140</b> | 360   | 100 | 119            | 129            | 900   | 1 130   | 151                                    | 218                                    |
| Z-531152.04.DRGL | 93               | <b>160</b> | 420   | 118 | 138            | 148            | 1 270   | 1 580   | 225                                    | 295                                    |
| Z-531153.04.DRGL | 131              | <b>180</b> | 460   | 118 | 153            | 160            | 1 430   | 1 690   | 255                                    | 320                                    |
| Z-531154.04.DRGL | 179              | <b>200</b> | 520   | 140 | 175            | 180            | 1 970   | 2 270   | 355                                    | 430                                    |
| Z-531156.04.DRGL | 237              | <b>220</b> | 560   | 140 | 195            | 205            | 2 240   | 2 380   | 395                                    | 450                                    |
| Z-531158.04.DRGL | 298              | <b>240</b> | 600   | 160 | 215            | 225            | 2 750   | 2 900   | 500                                    | 530                                    |
| Z-531159.04.DRGL | 380              | <b>240</b> | 650   | 170 | 215            | 225            | 2 900   | 3 250   | 490                                    | 600                                    |
| Z-531160.04.DRGL | 439              | <b>260</b> | 680   | 170 | 233            | 248            | 3 400   | 3 450   | 610                                    | 650                                    |
| Z-531162.04.DRGL | 453              | <b>280</b> | 700   | 180 | 233            | 248            | 3 400   | 3 750   | 600                                    | 680                                    |
| Z-531163.04.DRGL | 629              | <b>300</b> | 780   | 200 | 258            | 273            | 4 350   | 4 500   | 690                                    | 820                                    |
| Z-531177.04.DRGL | 727              | <b>300</b> | 780   | 240 | 280            | 300            | 4 750   | 5 500   | 800                                    | 980                                    |
| Z-531164.04.DRGL | 761              | <b>320</b> | 820   | 218 | 273            | 288            | 4 850   | 5 200   | 750                                    | 970                                    |
| Z-531166.04.DRGL | 928              | <b>340</b> | 870   | 230 | 295            | 310            | 5 500   | 5 700   | 890                                    | 1 040                                  |
| Z-531165.04.DRGL | 891              | <b>360</b> | 870   | 230 | 295            | 320            | 5 300   | 5 700   | 940                                    | 1 040                                  |
| Z-531167.04.DRGL | 1 170            | <b>380</b> | 960   | 243 | 315            | 335            | 6 500   | 6 800   | 990                                    | 1 170                                  |
| Z-531168.04.DRGL | 1 390            | <b>400</b> | 1 010 | 258 | 330            | 350            | 6 700   | 7 200   | 1 130                                  | 1 250                                  |

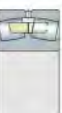
# Triple ring bearings

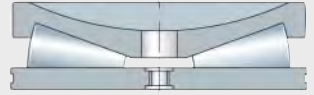
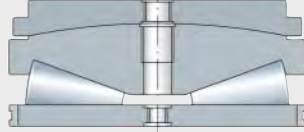
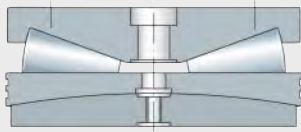
Farrel design



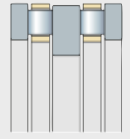
**Dimension table** · Dimensions in mm

| Designation             | Mass<br>m<br>≈kg | Dimensions |        |     |                |                | Basic load ratings                            |   | Fatigue limit load                     |  |
|-------------------------|------------------|------------|--------|-----|----------------|----------------|---|---|--|--|
|                         |                  | d          | D      | C   | B <sub>1</sub> | B <sub>2</sub> | dyn.<br>Inner bearing<br>C <sub>r</sub><br>kN | dyn.<br>Outer bearing<br>C <sub>r</sub><br>kN | Inner bearing<br>C <sub>ur</sub><br>kN | Outer bearing<br>C <sub>ur</sub><br>kN |
| <b>Z-548685.04.DRGL</b> | 82               | <b>150</b> | 393,7  | 118 | 118            | 130,7          | 1 040   | 1 320   | 108                                    | 280                                    |
| <b>Z-562656.04.DRGL</b> | 121              | <b>170</b> | 444,5  | 140 | 140            | 152,7          | 1 400   | 1 370   | 197                                    | 355                                    |
| <b>Z-562657.04.DRGL</b> | 157              | <b>190</b> | 482,6  | 150 | 150            | 162,7          | 1 630   | 1 700   | 163                                    | 405                                    |
| <b>Z-561310.04.DRGL</b> | 222              | <b>220</b> | 539,75 | 180 | 180            | 192,7          | 2 240   | 2 500   | 233                                    | 620                                    |
| <b>Z-534669.04.DRGL</b> | 294              | <b>240</b> | 590,55 | 200 | 200            | 212,7          | 2 700   | 2 800   | 360                                    | 690                                    |
| <b>Z-562132.04.DRGL</b> | 327              | <b>240</b> | 615,95 | 200 | 200            | 212,7          | 2 700   | 2 850   | 360                                    | 700                                    |
| <b>Z-549731.04.DRGL</b> | 404              | <b>280</b> | 666,75 | 218 | 218            | 230,7          | 3 400   | 3 500   | 520                                    | 850                                    |
| <b>Z-562658.04.DRGL</b> | 512              | <b>300</b> | 717,55 | 243 | 243            | 255,7          | 4 050   | 3 700   | 550                                    | 920                                    |
| <b>Z-561702.04.DRGL</b> | 642              | <b>320</b> | 768,35 | 258 | 258            | 270,7          | 4 400   | 4 250   | 600                                    | 1 110                                  |
| <b>Z-548181.04.DRGL</b> | 796              | <b>340</b> | 819,15 | 280 | 280            | 292,7          | 5 500   | 4 700   | 820                                    | 1 280                                  |
| <b>Z-562659.04.DRGL</b> | 937              | <b>360</b> | 869,95 | 290 | 290            | 302,7          | 5 900   | 5 500   | 880                                    | 1 440                                  |
| <b>Z-562660.04.DRGL</b> | 1 080            | <b>380</b> | 920,75 | 300 | 300            | 310,2          | 6 300   | 6 100   | 930                                    | 1 540                                  |
| <b>Z-562661.04.DRGL</b> | 1 270            | <b>400</b> | 971,55 | 315 | 315            | 327,7          | 7 000   | 7 000   | 960                                    | 1 740                                  |

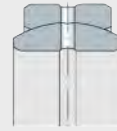
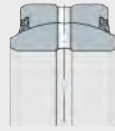




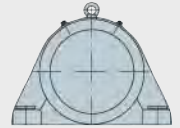
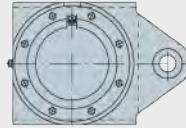
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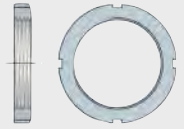
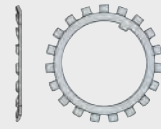
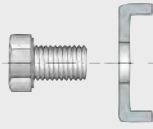
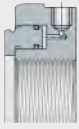
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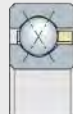
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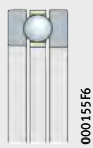
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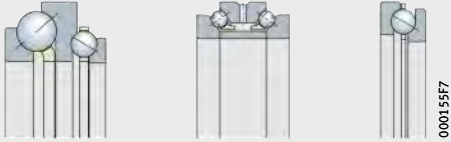


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### Axial deep groove ball bearings



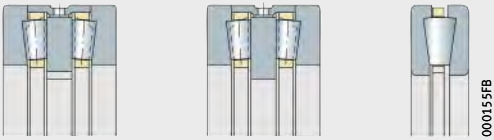
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### Axial angular contact ball bearings



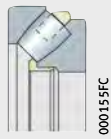
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### Axial cylindrical roller bearings



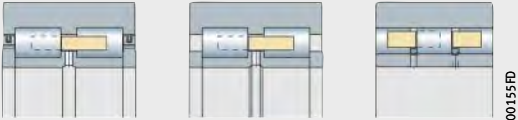
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### Axial tapered roller bearings



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### Axial spherical roller bearings



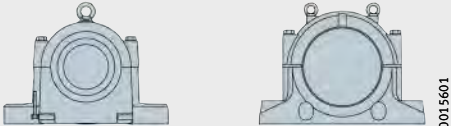
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### Back-up rollers



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### Spherical plain bearings



00015601

### Bearing housings



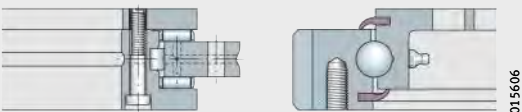
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### Fasteners and retainers



00015604

### Arcanol rolling bearing greases



00015606

### Other products

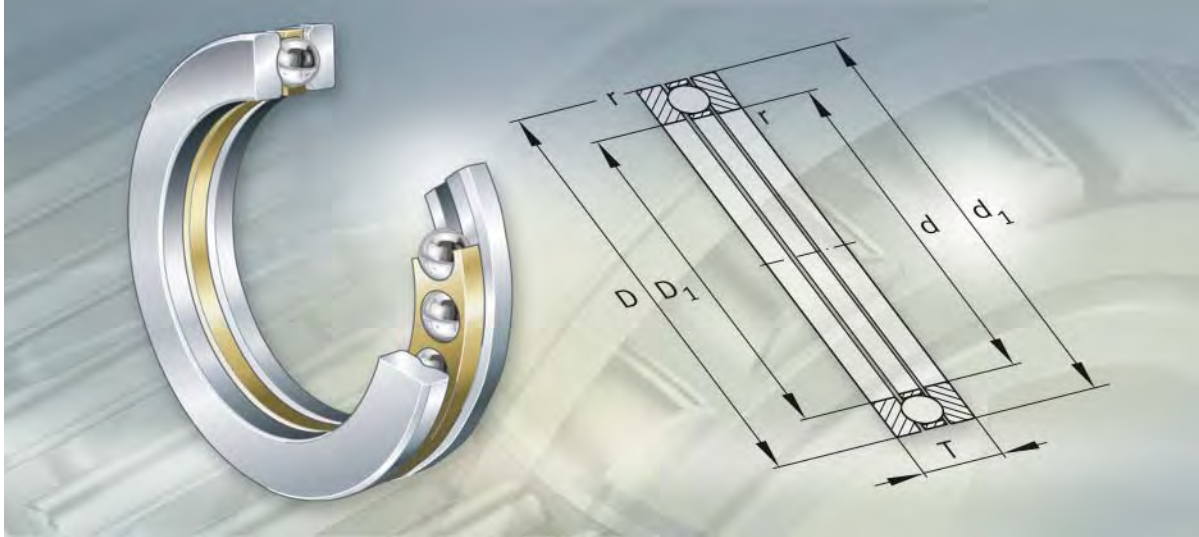


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### Market sectors

### Appendix

**FAG**



**Axial deep groove ball bearings**





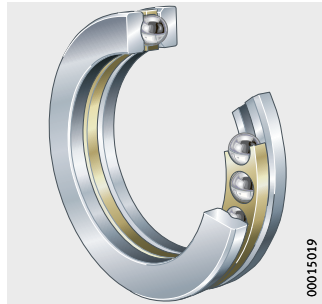
# Axial deep groove ball bearings

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## Product overview Axial deep groove ball bearings

Single direction

511, 512, 513, 514





# Axial deep groove ball bearings

**Features** Axial deep groove ball bearings comprise shaft locating washers, housing locating washers and ball and cage assemblies. The bearings are not self-retaining; the ball and cage assembly and bearing washers can therefore be mounted separately.

Single direction axial deep groove ball bearings can support axial forces in one direction, but must not be subjected to radial loads.

Bearings of series 511, 512, 513 and 514 have a flat housing locating washer. They do not permit angular misalignment or skewing between the shaft and housing.

**Operating temperature** Axial deep groove ball bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .

**Cages** Large axial deep groove ball bearings have ball-guided solid cages made from brass (suffix M or MP) or steel (suffix F or FP), see table.

**Suffixes** Suffixes for available designs: see table.

## Available designs

| Suffix | Description                           | Design                                      |
|--------|---------------------------------------|---|
| F      | Solid steel cage, ball-guided         | Standard                                    |
| FP     | Solid steel window cage, ball-guided  |   |
| M      | Solid brass cage, ball-guided         |   |
| MP     | Solid brass window cage, ball-guided  |   |
| P5     | Higher accuracy to tolerance class P5 | Special design, available by agreement only |
| P6     | Higher accuracy to tolerance class P6 |   |

# Axial deep groove ball bearings

## Design and safety guidelines



Axial deep groove ball bearings can support axial forces only.

## Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_a$$

$P$  kN  
Equivalent dynamic bearing load  
 $F_a$  kN  
Axial dynamic bearing load.

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0a}$  kN  
Axial static bearing load.

## Minimum axial load

At higher speeds, detrimental sliding movements can occur between the rolling elements and the raceways due to centrifugal forces and gyroscopic moments. In order to prevent slippage, the bearings must be subjected to a minimum load  $F_{a \min}$ . This can be achieved by means of preloading, for example using springs.

The minimum load factor  $A$  is given in the dimension tables. For  $n_{\max}$ , the maximum operating speed must be used.

$$F_{a \min} = A \cdot \left( \frac{n_{\max}}{1000} \right)^2$$

$F_{a \min}$  kN  
Minimum axial load  
 $A$  –  
Minimum load factor, see dimension table  
 $n_{\max}$   $\text{min}^{-1}$   
Maximum operating speed.



**Speeds** ISO 15 312 does not give thermal reference speeds for these bearings.



The dimension tables only state limiting speeds  $n_G$ . These values are for oil lubrication and must not be exceeded.

**Design  
of bearing arrangements  
Shaft and housing tolerances**

For single direction bearings, the shaft tolerance j6 should be selected.

The tolerance of the locating bore is dependent on the running accuracy to be achieved. For normal running accuracy, the tolerance should be in the tolerance zone E8, for high running accuracy it should be in the tolerance zone H6.

**Adjacent parts**

The shoulders on the adjacent construction (shaft and housing) must be sufficiently high that the shaft and housing locating washers are supported over at least half their height.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

The maximum values for the radii  $r_a$  and the diameters of the abutment surfaces  $d_a$ ,  $D_a$  are indicated in the dimension tables.

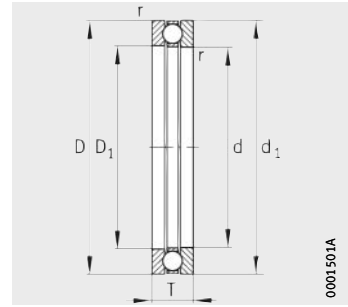
**Accuracy**

The dimensional and running tolerances correspond to tolerance class PN to DIN 620-3.

The main dimensions for single direction bearings correspond to ISO 104/DIN 711.

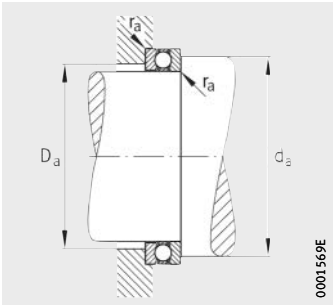
# Axial deep groove ball bearings

Single direction



**Dimension table** - Dimensions in mm

| Designation     | Mass<br>m<br>≈kg | Dimensions |     |     |                |                |           |
|-----------------|------------------|------------|-----|-----|----------------|----------------|-----------|
|                 |                  | d          | D   | T   | D <sub>1</sub> | d <sub>1</sub> | r<br>min. |
| <b>51338-MP</b> | 36,7             | <b>190</b> | 320 | 105 | 195            | 315            | 4         |
| <b>51340-MP</b> | 40,9             | <b>200</b> | 340 | 110 | 205            | 335            | 4         |
| <b>51344-MP</b> | 47               | <b>220</b> | 360 | 112 | 225            | 355            | 4         |
| <b>51248-MP</b> | 22,9             | <b>240</b> | 340 | 78  | 244            | 335            | 2,1       |
| <b>51448-M</b>  | 99,4             | <b>240</b> | 440 | 160 | 245            | 435            | 6         |
| <b>51152-MP</b> | 7,89             | <b>260</b> | 320 | 45  | 263            | 317            | 1,5       |
| <b>51252-MP</b> | 24,8             | <b>260</b> | 360 | 79  | 264            | 355            | 2,1       |
| <b>51352-MP</b> | 75,8             | <b>260</b> | 420 | 130 | 265            | 415            | 5         |
| <b>51156-MP</b> | 12               | <b>280</b> | 350 | 53  | 283            | 347            | 1,5       |
| <b>51256-MP</b> | 23,7             | <b>280</b> | 380 | 80  | 284            | 375            | 2,1       |
| <b>51356-MP</b> | 77,9             | <b>280</b> | 440 | 130 | 285            | 435            | 5         |
| <b>51456-M</b>  | 195              | <b>280</b> | 520 | 190 | 285            | 515            | 6         |
| <b>51160-MP</b> | 17,1             | <b>300</b> | 380 | 62  | 304            | 376            | 2         |
| <b>51260-MP</b> | 41,8             | <b>300</b> | 420 | 95  | 304            | 415            | 3         |
| <b>51460-M</b>  | 193              | <b>300</b> | 540 | 190 | 305            | 535            | 6         |
| <b>51164-MP</b> | 18,5             | <b>320</b> | 400 | 63  | 324            | 396            | 2         |
| <b>51264-MP</b> | 44,6             | <b>320</b> | 440 | 95  | 325            | 435            | 3         |
| <b>51364 F</b>  | 102              | <b>320</b> | 500 | 140 | 325            | 495            | 5         |
| <b>51168-MP</b> | 19,9             | <b>340</b> | 420 | 64  | 344            | 416            | 2         |
| <b>51268-MP</b> | 47,6             | <b>340</b> | 460 | 96  | 345            | 455            | 3         |
| <b>51368 F</b>  | 141              | <b>340</b> | 540 | 160 | 345            | 535            | 5         |
| <b>51368-M</b>  | 141              | <b>340</b> | 540 | 160 | 345            | 535            | 5         |
| <b>51172-MP</b> | 21,5             | <b>360</b> | 440 | 65  | 364            | 436            | 2         |
| <b>51272-MP</b> | 70,4             | <b>360</b> | 500 | 110 | 365            | 495            | 4         |
| <b>51372-M</b>  | 148              | <b>360</b> | 560 | 160 | 365            | 555            | 5         |
| <b>51176-MP</b> | 22,4             | <b>380</b> | 460 | 65  | 384            | 456            | 2         |
| <b>51276-MP</b> | 64,8             | <b>380</b> | 520 | 112 | 385            | 515            | 4         |
| <b>51376-M</b>  | 202              | <b>380</b> | 600 | 175 | 385            | 595            | 6         |
| <b>51476-M</b>  | 371              | <b>380</b> | 670 | 224 | 385            | 665            | 7,5       |

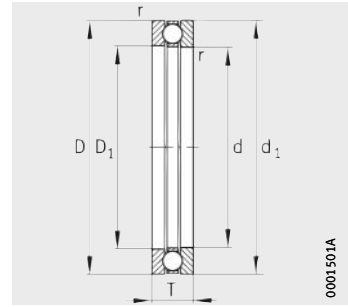


Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{Ua}$<br>kN | Minimum load factor<br>A<br>– | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-------------------------------|--|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |                                      |                               |  |
| 268                 | 2 42          | 3             | 585                 | 2 160                   | 60                                   | 24                            | 1 000  |
| 284                 | 256           | 3             | 620                 | 2 400                   | 65                                   | 30                            | 950  |
| 304                 | 276           | 3             | 640                 | 2 550                   | 67                                   | 34                            | 670  |
| 300                 | 280           | 2,1           | 465                 | 1 860                   | 48                                   | 18                            | 1 100  |
| 360                 | 320           | 5             | 1 080               | 4 750                   | 114                                  | 120                           | 480  |
| 296                 | 284           | 1,5           | 236                 | 1 020                   | 31,5                                 | 5,6                           | 1 500  |
| 320                 | 300           | 2,1           | 490                 | 2 040                   | 52                                   | 22                            | 1 000  |
| 356                 | 324           | 4             | 815                 | 3 600                   | 85                                   | 67                            | 560  |
| 322                 | 308           | 1,5           | 315                 | 1 340                   | 40,5                                 | 10                            | 1 300  |
| 340                 | 320           | 2,1           | 490                 | 2 160                   | 53                                   | 24                            | 950  |
| 376                 | 344           | 4             | 830                 | 3 800                   | 88                                   | 75                            | 560  |
| 424                 | 376           | 5             | 1 250               | 5 850                   | 129                                  | 190                           | 430  |
| 348                 | 332           | 2             | 365                 | 1 600                   | 46                                   | 14                            | 1 200  |
| 372                 | 348           | 2,5           | 585                 | 2 700                   | 62                                   | 38                            | 850  |
| 444                 | 396           | 5             | 1 460               | 7 200                   | 158                                  | 260                           | 400  |
| 368                 | 352           | 2             | 375                 | 1 700                   | 47,5                                 | 16                            | 1 100  |
| 392                 | 368           | 2,5           | 600                 | 2 800                   | 64                                   | 43                            | 850  |
| 428                 | 392           | 4             | 980                 | 4 900                   | 108                                  | 120                           | 480  |
| 388                 | 372           | 2             | 380                 | 1 800                   | 49                                   | 18                            | 750  |
| 412                 | 388           | 2,5           | 620                 | 3 050                   | 67                                   | 50                            | 600  |
| 460                 | 420           | 4             | 1 080               | 5 600                   | 118                                  | 160                           | 450  |
| 460                 | 420           | 4             | 1 080               | 5 600                   | 118                                  | 160                           | 450  |
| 408                 | 392           | 2             | 405                 | 2 000                   | 45                                   | 22                            | 700  |
| 444                 | 416           | 3             | 720                 | 3 650                   | 79                                   | 70                            | 530  |
| 480                 | 440           | 4             | 1 120               | 5 850                   | 122                                  | 180                           | 450  |
| 428                 | 412           | 2             | 430                 | 2 240                   | 48,5                                 | 24                            | 670  |
| 464                 | 436           | 3             | 750                 | 4 000                   | 84                                   | 80                            | 530  |
| 512                 | 468           | 5             | 1 220               | 6 700                   | 134                                  | 240                           | 430  |
| 554                 | 496           | 6             | 1 830               | 10 400                  | 201                                  | 560                           | 360  |

# Axial deep groove ball bearings

Single direction

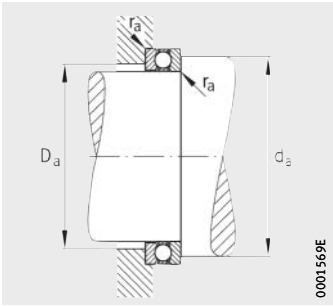


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**Dimension table** (continued) · Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions |       |     |                |                |           |
|-------------|------------------|------------|-------|-----|----------------|----------------|-----------|
|             |                  | d          | D     | T   | D <sub>1</sub> | d <sub>1</sub> | r<br>min. |
| 51180-MP    | 23,5             | 400        | 480   | 65  | 404            | 476            | 2         |
| 51280-MP    | 78,5             | 400        | 540   | 112 | 405            | 535            | 4         |
| 51480-M     | 454              | 400        | 710   | 243 | 405            | 705            | 7,5       |
| 51184-MP    | 24,4             | 420        | 500   | 65  | 424            | 495            | 2         |
| 51284-MP    | 108              | 420        | 580   | 130 | 425            | 575            | 5         |
| 51384-MP    | 220              | 420        | 650   | 180 | 425            | 645            | 6         |
| 51484-M     | 468              | 420        | 730   | 243 | 425            | 725            | 7,5       |
| 51288-MP    | 99,3             | 440        | 600   | 130 | 445            | 595            | 5         |
| 51388-M     | 276              | 440        | 680   | 190 | 445            | 675            | 6         |
| 51192-MP    | 37,2             | 460        | 560   | 80  | 464            | 555            | 2,1       |
| 51292-MP    | 103              | 460        | 620   | 130 | 465            | 615            | 5         |
| 51196-MP    | 38,7             | 480        | 580   | 80  | 484            | 575            | 2,1       |
| 51296-MP    | 130              | 480        | 650   | 135 | 485            | 645            | 5         |
| 511/500-MP  | 44,9             | 500        | 600   | 80  | 505            | 595            | 2,1       |
| 512/500-MP  | 144              | 500        | 670   | 135 | 505            | 665            | 5         |
| 511/530-MP  | 55,9             | 530        | 640   | 85  | 535            | 635            | 3         |
| 512/530-MP  | 158              | 530        | 710   | 140 | 535            | 705            | 5         |
| 511/560-MP  | 58,8             | 560        | 670   | 85  | 565            | 665            | 3         |
| 512/560-MP  | 204              | 560        | 750   | 150 | 565            | 745            | 5         |
| 511/600-MP  | 62,7             | 600        | 710   | 85  | 605            | 705            | 2         |
| 512/600-MP  | 240              | 600        | 800   | 160 | 605            | 795            | 5         |
| 513/600-M   | 572              | 600        | 900   | 236 | 605            | 895            | 7,5       |
| 511/630-FP  | 81,5             | 630        | 750   | 95  | 635            | 745            | 3         |
| 511/630-MP  | 82,1             | 630        | 750   | 95  | 635            | 745            | 3         |
| 512/630-M   | 287              | 630        | 850   | 175 | 635            | 845            | 6         |
| 512/630-MP  | 287              | 630        | 850   | 175 | 635            | 845            | 6         |
| 513/630-M   | 678              | 630        | 950   | 250 | 635            | 945            | 9,5       |
| 511/670-MP  | 105              | 670        | 800   | 105 | 675            | 795            | 4         |
| 512/670-MP  | 349              | 670        | 900   | 180 | 675            | 895            | 6         |
| 511/710-MP  | 113              | 710        | 850   | 112 | 715            | 845            | 4         |
| 512/710-MP  | 376              | 710        | 950   | 190 | 715            | 945            | 6         |
| 511/750-MP  | 147              | 750        | 900   | 120 | 755            | 895            | 4         |
| 512/750-MP  | 458              | 750        | 1 000 | 195 | 755            | 995            | 6         |



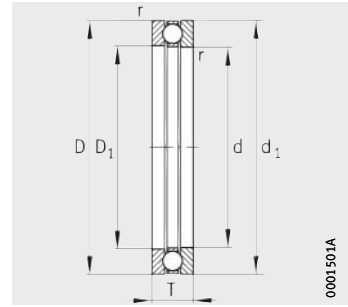


Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{Ua}$<br>kN | Minimum load factor<br>A<br>– | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-------------------------------|--|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |                                      |                               |  |
| 448                 | 432           | 2             | 440                 | 2 320                   | 49,5                                 | 28                            | 670  |
| 484                 | 456           | 3             | 800                 | 4 400                   | 92                                   | 100                           | 500  |
| 586                 | 524           | 6             | 1 930               | 11 400                  | 218                                  | 670                           | 340  |
| 468                 | 452           | 2             | 440                 | 2 450                   | 51                                   | 30                            | 630  |
| 516                 | 484           | 4             | 930                 | 5 200                   | 101                                  | 140                           | 480  |
| 558                 | 512           | 5             | 1 320               | 7 500                   | 145                                  | 300                           | 400  |
| 606                 | 544           | 6             | 1 900               | 11 400                  | 214                                  | 670                           | 340  |
| 536                 | 504           | 4             | 930                 | 5 400                   | 104                                  | 150                           | 450  |
| 584                 | 536           | 5             | 1 460               | 8 800                   | 164                                  | 400                           | 380  |
| 520                 | 500           | 2,1           | 530                 | 3 100                   | 61                                   | 50                            | 560  |
| 556                 | 524           | 4             | 950                 | 5 600                   | 106                                  | 170                           | 450  |
| 540                 | 520           | 2,1           | 540                 | 3 250                   | 63                                   | 53                            | 530  |
| 582                 | 548           | 4             | 1 020               | 6 200                   | 114                                  | 200                           | 430  |
| 560                 | 540           | 2,1           | 550                 | 3 350                   | 63                                   | 56                            | 530  |
| 602                 | 568           | 4             | 1 020               | 6 400                   | 116                                  | 220                           | 430  |
| 596                 | 574           | 2,5           | 620                 | 3 900                   | 73                                   | 80                            | 480  |
| 638                 | 602           | 4             | 1 120               | 7 100                   | 126                                  | 260                           | 400  |
| 626                 | 604           | 2,5           | 630                 | 4 150                   | 74                                   | 85                            | 480  |
| 674                 | 636           | 4             | 1 220               | 8 150                   | 143                                  | 340                           | 380  |
| 666                 | 644           | 2,5           | 640                 | 4 400                   | 76                                   | 100                           | 450  |
| 720                 | 680           | 4             | 1 320               | 9 000                   | 151                                  | 430                           | 360  |
| 780                 | 720           | 6             | 2 000               | 14 300                  | 229                                  | 1 100                         | 320  |
| 702                 | 678           | 2,5           | 720                 | 5 000                   | 84                                   | 130                           | 430  |
| 702                 | 678           | 2,5           | 720                 | 5 000                   | 84                                   | 130                           | 430  |
| 762                 | 718           | 5             | 1 460               | 10 400                  | 172                                  | 600                           | 340  |
| 762                 | 718           | 5             | 1 460               | 10 400                  | 172                                  | 600                           | 340  |
| 822                 | 758           | 8             | 2 120               | 15 600                  | 248                                  | 1 300                         | 300  |
| 744                 | 722           | 3             | 800                 | 5 700                   | 94                                   | 170                           | 400  |
| 808                 | 762           | 5             | 1 560               | 11 600                  | 183                                  | 700                           | 340  |
| 794                 | 766           | 3             | 865                 | 6 550                   | 104                                  | 220                           | 380  |
| 854                 | 806           | 5             | 1 660               | 12 700                  | 201                                  | 850                           | 320  |
| 840                 | 810           | 3             | 1 020               | 7 800                   | 124                                  | 320                           | 360  |
| 900                 | 850           | 5             | 1 800               | 14 000                  | 212                                  | 1 000                         | 320  |

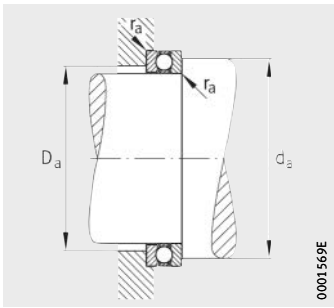
# Axial deep groove ball bearings

Single direction



**Dimension table** (continued) · Dimensions in mm

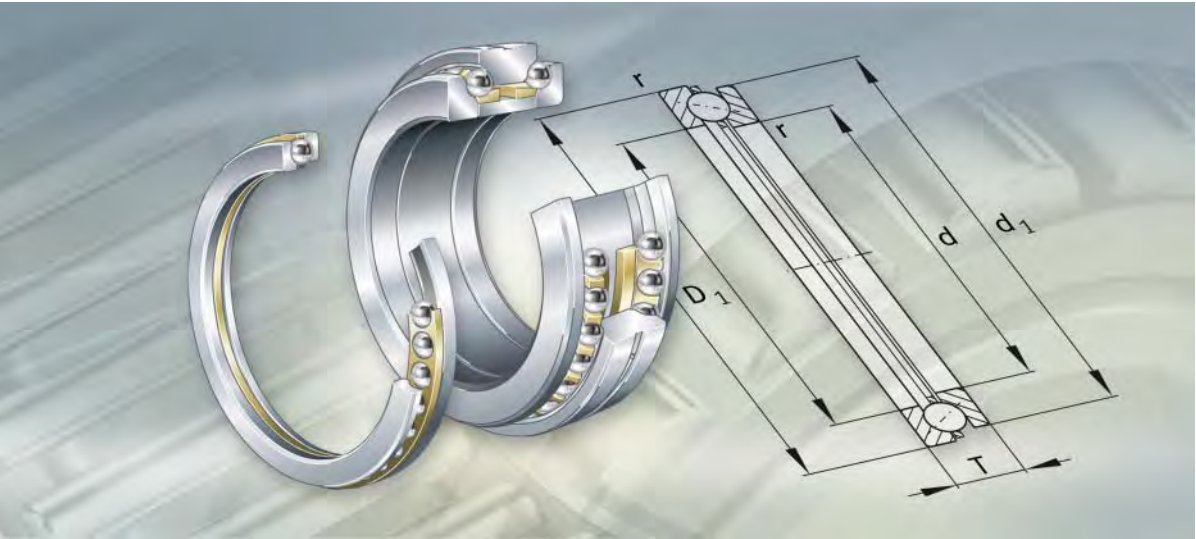
| Designation        | Mass<br>m<br>≈kg | Dimensions   |       |     |                |                |           |
|--------------------|------------------|--------------|-------|-----|----------------|----------------|-----------|
|                    |                  | d            | D     | T   | D <sub>1</sub> | d <sub>1</sub> | r<br>min. |
| <b>511/800-MP</b>  | 157              | <b>800</b>   | 950   | 120 | 805            | 945            | 4         |
| <b>512/800-M</b>   | 532              | <b>800</b>   | 1 060 | 205 | 805            | 1 055          | 7,5       |
| <b>512/800-MP</b>  | 532              | <b>800</b>   | 1 060 | 205 | 805            | 1 055          | 7,5       |
| <b>511/850-MP</b>  | 168              | <b>850</b>   | 1 000 | 120 | 855            | 995            | 4         |
| <b>512/850-MP</b>  | 493              | <b>850</b>   | 1 120 | 212 | 855            | 1 115          | 7,5       |
| <b>511/900-MP</b>  | 217              | <b>900</b>   | 1 060 | 130 | 905            | 1 055          | 5         |
| <b>512/900-MP</b>  | 691              | <b>900</b>   | 1 180 | 220 | 905            | 1 175          | 7,5       |
| <b>511/950-MP</b>  | 250              | <b>950</b>   | 1 120 | 135 | 955            | 1 115          | 5         |
| <b>512/950-M</b>   | 838              | <b>950</b>   | 1 250 | 236 | 955            | 1 245          | 7,5       |
| <b>512/950-MP</b>  | 838              | <b>950</b>   | 1 250 | 236 | 955            | 1 245          | 7,5       |
| <b>511/1000-MP</b> | 278              | <b>1 000</b> | 1 180 | 140 | 1 005          | 1 175          | 5         |
| <b>512/1000-MP</b> | 998              | <b>1 000</b> | 1 320 | 250 | 1 005          | 1 315          | 9,5       |
| <b>511/1060-MP</b> | 353              | <b>1 060</b> | 1 250 | 150 | 1 065          | 1 245          | 5         |
| <b>512/1060-MP</b> | 1 200            | <b>1 060</b> | 1 400 | 265 | 1 065          | 1 395          | 9,5       |
| <b>511/1120-MP</b> | 390              | <b>1 120</b> | 1 320 | 160 | 1 125          | 1 315          | 5         |
| <b>511/1180-MP</b> | 533              | <b>1 180</b> | 1 400 | 175 | 1 185          | 1 395          | 6         |
| <b>511/1250-MP</b> | 507              | <b>1 250</b> | 1 460 | 175 | 1 255          | 1 455          | 6         |
| <b>511/1320-MP</b> | 594              | <b>1 320</b> | 1 540 | 175 | 1 325          | 1 535          | 6         |
| <b>511/1400-MP</b> | 643              | <b>1 400</b> | 1 630 | 180 | 1 410          | 1 620          | 6         |
| <b>511/1500-M</b>  | 836              | <b>1 500</b> | 1 750 | 195 | 1 510          | 1 740          | 6         |
| <b>511/1700-M</b>  | 1 110            | <b>1 700</b> | 1 970 | 212 | 1 710          | 1 960          | 7,5       |



Mounting dimensions

| Mounting dimensions |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{Ua}$<br>kN | Minimum load factor<br>A<br>– | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|-------------------------------|--|
| $d_a$<br>min.       | $D_a$<br>max. | $r_a$<br>max. | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |                                      |                               |  |
| 890                 | 860           | 3             | 1 020               | 8 300                   | 125                                  | 360                           | 340  |
| 956                 | 904           | 6             | 1 860               | 15 000                  | 221                                  | 1 200                         | 300  |
| 956                 | 904           | 6             | 1 860               | 15 000                  | 221                                  | 1 200                         | 300  |
| 940                 | 910           | 3             | 1 060               | 8 800                   | 130                                  | 400                           | 340  |
| 1 012               | 958           | 6             | 2 040               | 17 300                  | 243                                  | 1 500                         | 280  |
| 996                 | 964           | 4             | 1 080               | 9 300                   | 132                                  | 450                           | 320  |
| 1 068               | 1 012         | 6             | 2 160               | 19 000                  | 265                                  | 1 900                         | 260  |
| 1 052               | 1 018         | 4             | 1 220               | 11 000                  | 151                                  | 630                           | 320  |
| 1 130               | 1 070         | 6             | 2 320               | 20 800                  | 280                                  | 2 200                         | 240  |
| 1 130               | 1 070         | 6             | 2 320               | 20 800                  | 280                                  | 2 200                         | 240  |
| 1 108               | 1 072         | 4             | 1 320               | 12 200                  | 163                                  | 750                           | 300  |
| 1 192               | 1 128         | 8             | 2 550               | 24 000                  | 315                                  | 3 000                         | 220  |
| 1 174               | 1 136         | 4             | 1 530               | 14 600                  | 193                                  | 1 100                         | 280  |
| 1 264               | 1 196         | 8             | 2 800               | 27 000                  | 340                                  | 3 800                         | 200  |
| 1 240               | 1 200         | 4             | 1 500               | 14 600                  | 187                                  | 1 100                         | 260  |
| 1 312               | 1 268         | 5             | 1 660               | 17 000                  | 209                                  | 1 500                         | 240  |
| 1 378               | 1 332         | 5             | 1 730               | 18 300                  | 221                                  | 1 700                         | 220  |
| 1 454               | 1 406         | 5             | 1 760               | 19 000                  | 224                                  | 1 900                         | 200  |
| 1 540               | 1 490         | 5             | 1 930               | 22 000                  | 250                                  | 2 400                         | 200  |
| 1 651               | 1 599         | 5             | 2 120               | 25 000                  | 270                                  | 3 200                         | 180  |
| 1 862               | 1 808         | 6             | 2 400               | 30 000                  | 315                                  | 4 800                         | 170  |





## Axial angular contact ball bearings

Single direction  
Double direction

# Axial angular contact ball bearings

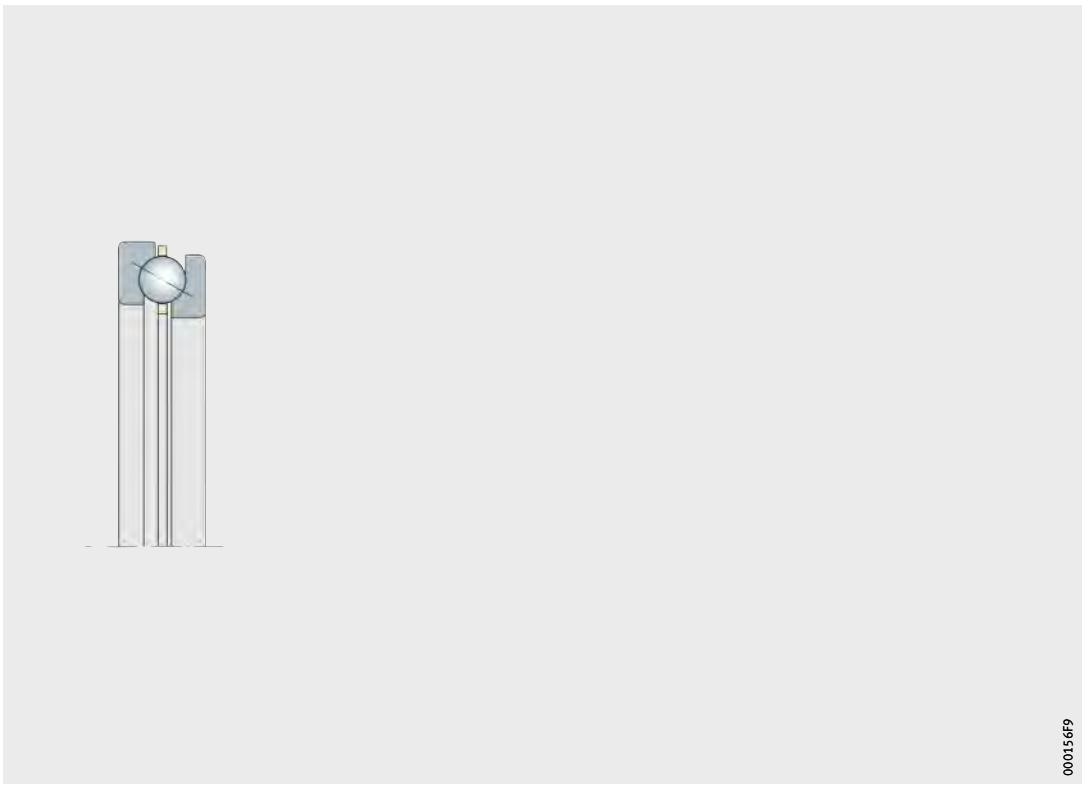
## **Single direction axial angular contact ball bearings** ..... 750

Single direction axial angular ball bearings can support high axial forces in one direction. They are only suitable for radial forces under certain conditions. The bearings are separable. As a result, the rings can be mounted separately. At higher speeds, a minimum axial load is required. The inch size main dimensions and designations (Z-5..ASKL) of these special bearings are not standardised. A typical application for these axial angular contact ball bearings is in rotary tables for drilling rigs.

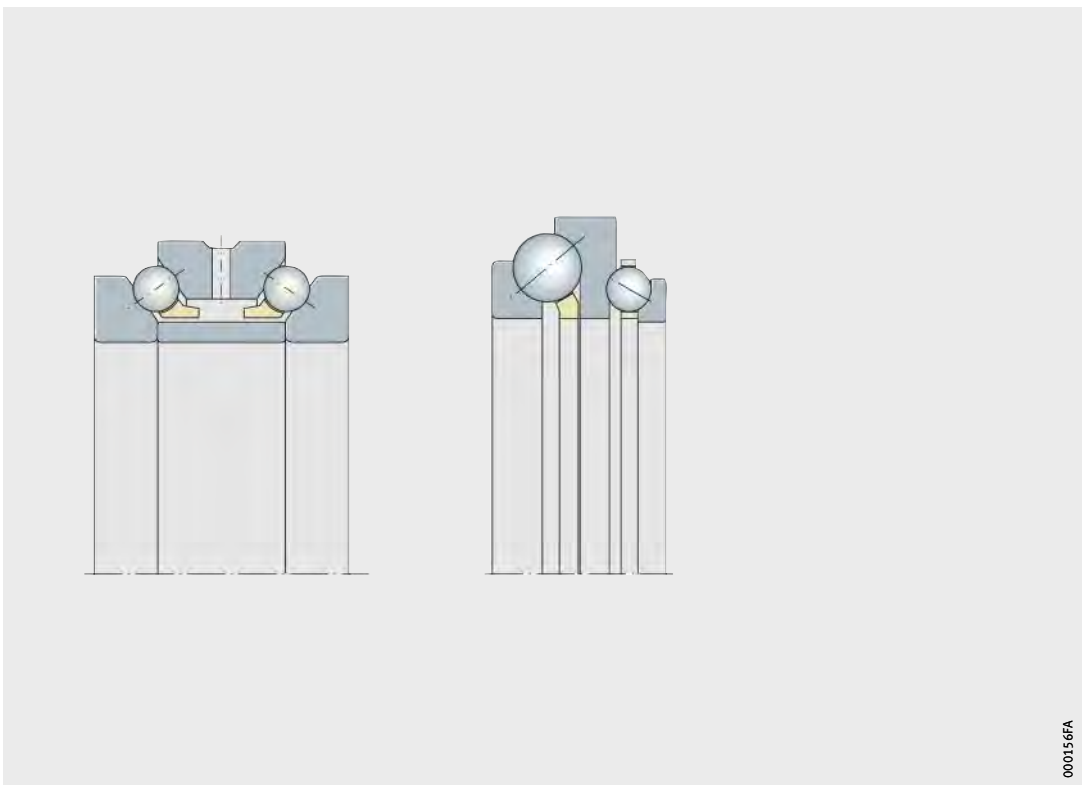
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## **Double direction axial angular contact ball bearings** ..... 760

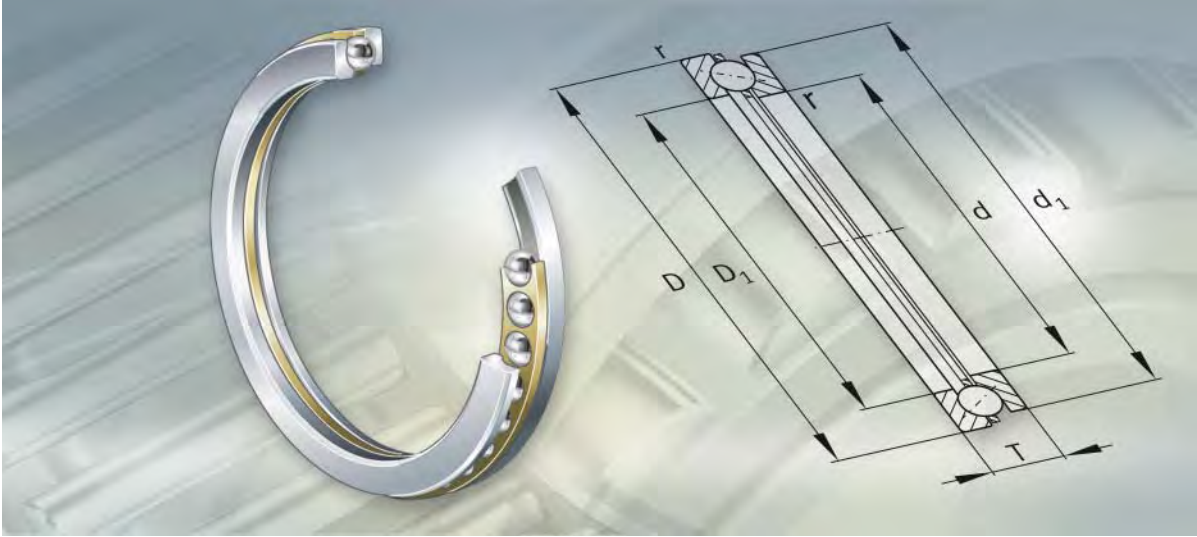
Double direction axial angular contact ball bearings can support axial forces in both directions. Bearings of series 2344 and 2347 with metric dimensions are used as high precision bearings in machine tool spindles. The axial angular contact ball bearing is arranged against a double row cylindrical roller bearing of series NN30 that supports the radial forces. The parts of the axial bearing can be mounted separately. For rotary tables in drilling rigs, double direction axial angular contact ball bearings with inch size main dimensions and non-standardised designations (Z-5..ASKLZ) were developed. These special bearings comprise an upper bearing capable of supporting loads and a smaller bearing that fulfils the counterstay function. These bearings can support not only axial loads but also radial and moment loads. The bearing parts can be mounted separately.



000156F9



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**Single direction axial angular contact ball bearings**



# Single direction axial angular contact ball bearings



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# Product overview **Single direction axial angular contact ball bearings**

**Bearings for rotary tables**

Z-5..ASKL1



# Single direction axial angular contact ball bearings



**Features** Single direction axial angular contact ball bearings comprise a shaft locating washer and a housing locating washer, into which raceways are machined, and a cage with balls. Due to the large number of balls, the bearings have high rigidity. The cage is guided on the rib of the housing locating washer. Single direction axial angular contact ball bearings are separable. The bearing washers and the cage can be mounted separately.

Single direction axial angular contact ball bearings do not permit angular misalignment or skewing between the shaft and housing.

Single direction axial angular contact ball bearings have non-standardised inch size dimensions and designations (Z-5..ASKL).

**Axial and radial load capacity** In their main application in rotary tables for drilling rigs, two axial angular contact ball bearings are axially adjusted against each other. The upper bearing with the higher load carrying capacity can support very high axial forces (the weight of the drill string) in one direction. The bearings are only suitable for radial loads under certain conditions.

**Sealing** Axial angular contact ball bearings are of an open design.

**Lubrication** Due to the vertical arrangement of the shaft, the single direction axial angular contact ball bearings are lubricated with oil.

**Operating temperature** The single direction axial angular contact ball bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .

**Cage** The solid brass cage is guided on the rib of the housing locating washer.

# Single direction axial angular contact ball bearings

## Design and safety guidelines

### Equivalent dynamic bearing load

Single direction axial angular ball bearings can support axial forces and low radial forces.

For bearings under dynamic loading, the following applies:

$$P = F_a + 0,92 \cdot F_r$$

$P$  kN  
Equivalent dynamic bearing load  
 $F_a$  kN  
Axial dynamic bearing load  
 $F_r$  kN  
Radial dynamic bearing load.

### Equivalent static bearing load

Single direction axial angular ball bearings can support axial forces and low radial forces.

For bearings under static loading, the following applies:

$$P_0 = F_{0a} + 4 \cdot F_{0r}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0a}$  kN  
Axial static bearing load  
 $F_{0r}$  kN  
Radial static bearing load.

### Minimum axial load

At higher speeds, detrimental sliding movements can occur between the rolling elements and the raceways due to centrifugal forces and gyroscopic moments. In order to prevent slippage, the bearings must be subjected to a minimum load  $F_{a \min}$ .

The minimum load factor  $A$  is given in the dimension tables.

For  $n_{\max}$ , the maximum operating speed must be used.

$$F_{a \min} = A \cdot \left( \frac{n_{\max}}{1000} \right)^2$$

$F_{a \min}$  kN  
Minimum axial load  
 $A$  –  
Minimum load factor, see dimension table  
 $n_{\max}$   $\text{min}^{-1}$   
Maximum operating speed.

In general, the axial load due to the inherent weight of the bearing parts or the preload is already higher than the required minimum load.



**Accuracy** The normal tolerances of the bearings for rotary tables are given in the following tables.

**Tolerances for shaft locating washer**

| Bore d<br>mm |       | Bore deviation<br>$\Delta_{dmp}$<br>$\mu\text{m}$ |      |
|--------------|-------|---|------|
| over         | incl. |   |      |
| 250          | 315   | 0   | -36  |
| 315          | 400   | 0   | -41  |
| 400          | 500   | 0   | -46  |
| 500          | 630   | 0   | -51  |
| 630          | 800   | 0   | -76  |
| 800          | 1 000 | 0   | -102 |
| 1 000        | 1 250 | 0   | -127 |
| 1 250        | 1 600 | 0   | -165 |

**Tolerances for housing locating washer**

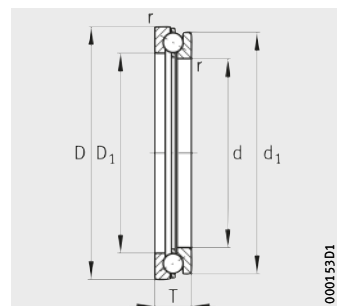
| Outside diameter D<br>mm |       | Outside diameter deviation<br>$\Delta_{Dmp}$<br>$\mu\text{m}$ |      |
|--------------------------|-------|---|------|
| over                     | incl. |   |      |
| 315                      | 400   | 0   | -41  |
| 400                      | 500   | 0   | -46  |
| 500                      | 630   | 0   | -51  |
| 630                      | 800   | 0   | -76  |
| 800                      | 1 000 | 0   | -102 |
| 1 000                    | 1 250 | 0   | -127 |
| 1 250                    | 1 600 | 0   | -165 |

**Tolerances for nominal bearing height**

| Bore d<br>mm |       | Deviation of nominal bearing height<br>$\Delta_{Ts}$<br>$\mu\text{m}$ |      |
|--------------|-------|---|------|
| over         | incl. |   |      |
| 250          | 315   | +254  | -254 |
| 315          | 400   | +254  | -254 |
| 400          | 500   | +254  | -254 |
| 500          | 630   | +381  | -381 |
| 630          | 800   | +381  | -381 |
| 800          | 1 000 | +381  | -381 |
| 1 000        | 1 250 | +381  | -381 |
| 1 250        | 1 600 | +381  | -381 |

# Axial angular contact ball bearings

Single direction



000153D1

**Dimension table** - Dimensions in mm

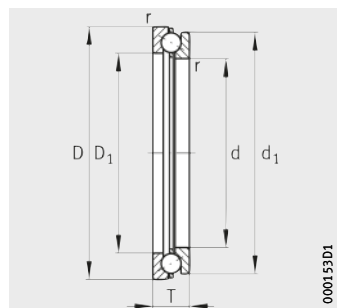
| Designation   | Mass<br>m<br>≈kg | Dimensions     |         |         |           |                |                |
|---------------|------------------|----------------|---------|---------|-----------|----------------|----------------|
|               |                  | d              | D       | T       | r<br>min. | D <sub>1</sub> | d <sub>1</sub> |
| Z-547627.ASKL | 16,3             | <b>292,1</b>   | 368,3   | 63,5    | 3,2       | 298,45         | 361,95         |
| Z-547628.ASKL | 15,1             | <b>292,1</b>   | 381     | 50,8    | 3,2       | 304,8          | 368,3          |
| Z-547629.ASKL | 17,5             | <b>304,8</b>   | 406,4   | 57,15   | 3,2       | 342,9          | 368,3          |
| Z-547630.ASKL | 12,9             | <b>352,425</b> | 430,149 | 47,625  | 1,6       | 374,65         | 412,75         |
| Z-547631.ASKL | 22,7             | <b>371,475</b> | 476,25  | 57,15   | 4,8       | 401,625        | 446,075        |
| Z-547632.ASKL | 47,4             | <b>381</b>     | 520,7   | 84,125  | 4,8       | 419,1          | 482,6          |
| Z-560590.ASKL | 27,4             | <b>420</b>     | 520     | 65      | 3         | 440            | 500            |
| Z-547633.ASKL | 42,6             | <b>427,025</b> | 565,15  | 69,85   | 3,2       | 463,55         | 515,925        |
| Z-547634.ASKL | 87,9             | <b>431,8</b>   | 635     | 88,9    | 8         | 488,95         | 565,15         |
| Z-547635.ASKL | 39,8             | <b>438,252</b> | 577,85  | 69,977  | 6,35      | 501,65         | 514,35         |
| Z-547636.ASKL | 28,5             | <b>450,85</b>  | 558,8   | 58,725  | 3,2       | 482,6          | 525,145        |
| Z-547637.ASKL | 46,2             | <b>457,2</b>   | 584,2   | 76,2    | 6,35      | 482,6          | 549,275        |
| Z-547638.ASKL | 70,7             | <b>457,2</b>   | 624,475 | 92,075  | 3,2       | 508            | 549,275        |
| Z-547640.ASKL | 162              | <b>488,95</b>  | 742,95  | 127     | 6,35      | 596,9          | 635            |
| Z-535503.ASKL | 26,1             | <b>495,3</b>   | 584,2   | 57,15   | 3,2       | 508            | 571,5          |
| Z-547560.ASKL | 120              | <b>508</b>     | 704,85  | 117,475 | 6,35      | 565,15         | 628,65         |
| Z-547561.ASKL | 121              | <b>508</b>     | 704,85  | 117,475 | 6,35      | 565,15         | 628,65         |
| Z-544556.ASKL | 38,2             | <b>511,15</b>  | 628,65  | 66,93   | 3         | 549,28         | 590,55         |
| Z-547641.ASKL | 38,9             | <b>511,175</b> | 628,65  | 66,675  | 3,2       | 549,275        | 590,55         |
| Z-546868.ASKL | 102              | <b>514,248</b> | 704,85  | 114,554 | 6,5       | 571,627        | 622,3          |
| Z-544554.ASKL | 107              | <b>514,248</b> | 704,85  | 114,554 | 6,35      | 571,5          | 622,3          |
| Z-524431.ASKL | 111              | <b>514,274</b> | 704,85  | 114,3   | 6,35      | 571,5          | 622,3          |
| Z-547562.ASKL | 115              | <b>514,35</b>  | 704,85  | 114,3   | 6,35      | 571,5          | 622,3          |
| Z-547643.ASKL | 139              | <b>577,85</b>  | 774,7   | 117,475 | 6,35      | 622,3          | 704,85         |
| Z-547642.ASKL | 140              | <b>577,85</b>  | 774,7   | 117,475 | 6,35      | 622,3          | 704,85         |
| Z-547409.ASKL | 81               | <b>580</b>     | 750     | 85      | 6         | 595            | 620            |
| Z-546867.ASKL | 125              | <b>593,699</b> | 790,575 | 117,729 | 6,5       | 650,748        | 720,725        |
| Z-547644.ASKL | 139              | <b>593,725</b> | 790,575 | 117,475 | 6,35      | 650,875        | 720,725        |
| Z-547563.ASKL | 140              | <b>593,725</b> | 790,575 | 117,475 | 6,35      | 650,875        | 720,725        |
| Z-547565.ASKL | 194              | <b>606,425</b> | 847,725 | 133,35  | 6,35      | 688,975        | 739,775        |
| Z-547564.ASKL | 189              | <b>606,425</b> | 847,725 | 133,35  | 6,35      | 688,975        | 739,775        |
| Z-547645.ASKL | 197              | <b>609,6</b>   | 850,9   | 133,35  | 3,2       | 692,15         | 742,95         |



| Basic load ratings           |                                | Minimum load factor | Limiting speed                      |
|------------------------------|--------------------------------|---------------------|-------------------------------------|
| dyn.<br>C <sub>a</sub><br>kN | stat.<br>C <sub>0a</sub><br>kN | A<br>–              | n <sub>G</sub><br>min <sup>-1</sup> |
| 340                          | 1 480                          | 6,3                 | 2 000                               |
| 245                          | 865                            | 4,8                 | 1 900                               |
| 465                          | 2 130                          | 12                  | 1 800                               |
| 390                          | 1 950                          | 10                  | 1 800                               |
| 495                          | 2 550                          | 17                  | 1 600                               |
| 670                          | 3 400                          | 34                  | 1 500                               |
| 400                          | 1 760                          | 19                  | 900                                 |
| 540                          | 2 750                          | 28                  | 1 400                               |
| 620                          | 3 000                          | 53                  | 1 100                               |
| 375                          | 1 700                          | 20                  | 1 300                               |
| 425                          | 1 960                          | 24                  | 1 300                               |
| 650                          | 3 750                          | 40                  | 1 400                               |
| 735                          | 3 250                          | 75                  | 1 000                               |
| 735                          | 3 450                          | 90                  | 900                                 |
| 375                          | 1 830                          | 20                  | 1 300                               |
| 1 270                        | 8 500                          | 170                 | 1 200                               |
| 1 330                        | 9 400                          | 160                 | 1 000                               |
| 690                          | 4 250                          | 38                  | 1 200                               |
| 465                          | 2 320                          | 32                  | 1 100                               |
| 1 020                        | 4 650                          | 56                  | 850                                 |
| 1 160                        | 7 200                          | 120                 | 630                                 |
| 640                          | 2 850                          | 70                  | 900                                 |
| 865                          | 4 400                          | 110                 | 900                                 |
| 630                          | 3 350                          | 75                  | 900                                 |
| 900                          | 4 900                          | 150                 | 850                                 |
| 720                          | 4 150                          | 110                 | 950                                 |
| 1 080                        | 5 500                          | 75                  | 800                                 |
| 610                          | 3 000                          | 80                  | 850                                 |
| 880                          | 5 000                          | 140                 | 850                                 |
| 780                          | 4 150                          | 130                 | 800                                 |
| 800                          | 4 400                          | 130                 | 800                                 |
| 1 570                        | 11 200                         | 320                 | 850                                 |

# Axial angular contact ball bearings

Single direction



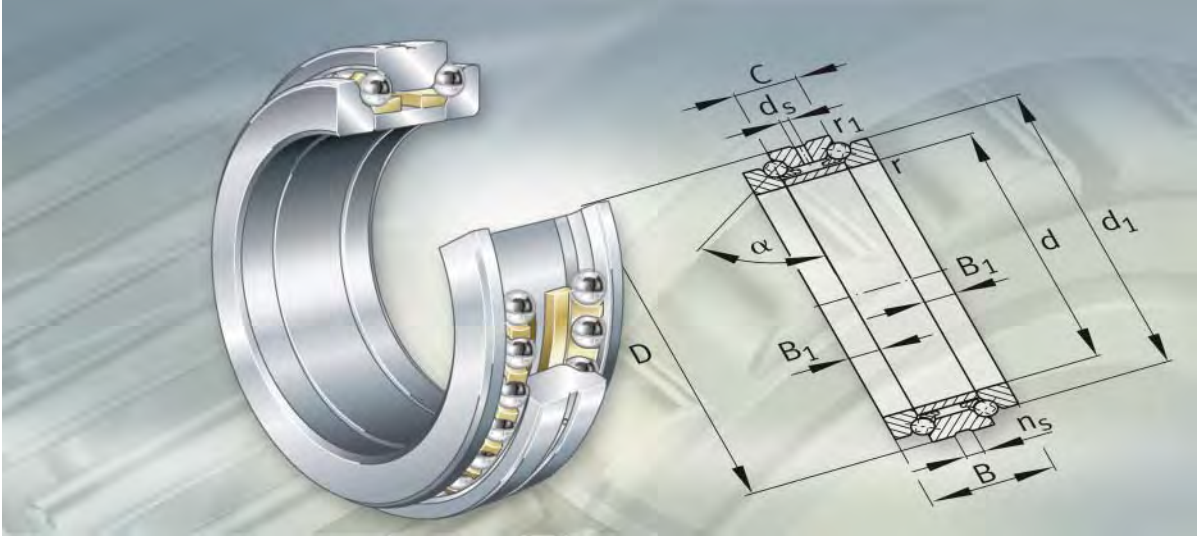
Dimension table (continued) · Dimensions in mm

| Designation   | Mass<br>m<br>≈kg | Dimensions       |           |         |           |                |                |
|---------------|------------------|------------------|-----------|---------|-----------|----------------|----------------|
|               |                  | d                | D         | T       | r<br>min. | D <sub>1</sub> | d <sub>1</sub> |
| Z-547646.ASKL | 157              | <b>622,3</b>     | 831,85    | 117,475 | 6,35      | 679,45         | 742,95         |
| Z-547647.ASKL | 159              | <b>622,3</b>     | 831,85    | 117,475 | 6,35      | 679,45         | 742,95         |
| Z-547410.ASKL | 161              | <b>635</b>       | 855       | 110     | 6         | 720            | 770            |
| Z-547648.ASKL | 84,4             | <b>641,35</b>    | 793,75    | 88,9    | 6,35      | 708,025        | 746,125        |
| Z-544553.ASKL | 65,9             | <b>641,426</b>   | 793,75    | 133,35  | 6,35      | 727,075        | 790,575        |
| Z-547650.ASKL | 180              | <b>660,35</b>    | 895,35    | 133,604 | 6,35      | 727,075        | 790,575        |
| Z-547649.ASKL | 209              | <b>660,4</b>     | 895,35    | 133,35  | 6,35      | 727,075        | 790,575        |
| Z-547650.ASKL | 205              | <b>667,69</b>    | 914,4     | 127     | 6,35      | 768,35         | 806,45         |
| Z-547651.ASKL | 293              | <b>723,9</b>     | 977,9     | 168,275 | 6,35      | 825,5          | 876,3          |
| Z-544552.ASKL | 84,7             | <b>768,045</b>   | 920,75    | 89,281  | 6,35      | 835,025        | 873,12         |
| Z-547653.ASKL | 254              | <b>768,35</b>    | 1 006,475 | 139,7   | 6,35      | 838,2          | 901,7          |
| Z-547654.ASKL | 250              | <b>768,604</b>   | 1 006,475 | 139,7   | 6,35      | 838,2          | 907,1          |
| Z-546866.ASKL | 47,8             | <b>771,449</b>   | 898,525   | 63,881  | 6,5       | 809,625        | 860,425        |
| Z-547655.ASKL | 110              | <b>785,825</b>   | 952,5     | 95,25   | 6,35      | 857,25         | 882,65         |
| Z-547656.ASKL | 216              | <b>787,4</b>     | 1 006,475 | 127     | 6,35      | 850,9          | 908,05         |
| Z-547657.ASKL | 237              | <b>787,4</b>     | 1 025,525 | 139,7   | 6,35      | 893,75         | 917,575        |
| Z-547658.ASKL | 237              | <b>787,4</b>     | 1 025,525 | 139,7   | 6,35      | 893,75         | 917,575        |
| Z-544551.ASKL | 193              | <b>787,4</b>     | 1 025,525 | 139,954 | 6,35      | 893,775        | 917,575        |
| Z-546865.ASKL | 204              | <b>806,399</b>   | 1 025,525 | 127,254 | 6,5       | 872,998        | 933,577        |
| Z-543689.ASKL | 218              | <b>806,45</b>    | 1 025,525 | 127     | 6,35      | 873,125        | 933,45         |
| Z-541269.ASKL | 171              | <b>1 020</b>     | 1 180     | 100     | 6         | 1 035          | 1 165          |
| Z-547241.ASKL | 132              | <b>1 022,223</b> | 1 181,1   | 89,154  | 6,5       | 1 069,975      | 1 133,475      |
| Z-546864.ASKL | 118              | <b>1 022,223</b> | 1 181,1   | 89,154  | 6,5       | 1 069,975      | 1 133,475      |
| Z-560354.ASKL | 448              | <b>1 030</b>     | 1 290     | 160     | 10        | 1 080          | 1 240          |
| Z-547242.ASKL | 285              | <b>1 041,273</b> | 1 260,475 | 127,254 | 6,35      | 1 112,825      | 1 189,025      |
| Z-546863.ASKL | 257              | <b>1 066,673</b> | 1 285,875 | 127,38  | 6,5       | 1 138,098      | 1 214,552      |
| Z-525290.ASKL | 253              | <b>1 073,15</b>  | 1 295,4   | 114,3   | 6,35      | 1 136,65       | 1 193,8        |
| Z-540716.ASKL | 208              | <b>1 330</b>     | 1 490     | 110     | 6         | 1 345          | 1 475          |
| Z-546862.ASKL | 165              | <b>1 364,123</b> | 1 517,65  | 105,156 | 6,5       | 1 406,525      | 1 457,325      |
| Z-546861.ASKL | 385              | <b>1 371,523</b> | 1 619,25  | 140,081 | 6,5       | 1 457,325      | 1 533,525      |





| Basic load ratings           |                                | Minimum load factor | Limiting speed                      |
|------------------------------|--------------------------------|---------------------|-------------------------------------|
| dyn.<br>C <sub>a</sub><br>kN | stat.<br>C <sub>0a</sub><br>kN | A<br>–              | n <sub>G</sub><br>min <sup>-1</sup> |
| 830                          | 4 650                          | 140                 | 800                                 |
| 915                          | 5 000                          | 170                 | 800                                 |
| 1 170                        | 8 000                          | 220                 | 800                                 |
| 670                          | 3 800                          | 90                  | 850                                 |
| 940                          | 6 400                          | 110                 | 850                                 |
| 1 560                        | 11 300                         | 300                 | 750                                 |
| 1 080                        | 6 400                          | 240                 | 700                                 |
| 1 000                        | 5 700                          | 220                 | 700                                 |
| 1 850                        | 14 800                         | 530                 | 700                                 |
| 1 030                        | 8 100                          | 150                 | 500                                 |
| 1 200                        | 7 800                          | 360                 | 630                                 |
| 830                          | 5 100                          | 190                 | 670                                 |
| 800                          | 7 200                          | 75                  | 560                                 |
| 850                          | 7 100                          | 130                 | 800                                 |
| 1 020                        | 6 300                          | 280                 | 630                                 |
| 850                          | 5 200                          | 200                 | 670                                 |
| 1 140                        | 7 500                          | 340                 | 630                                 |
| 1 670                        | 13 500                         | 400                 | 450                                 |
| 1 460                        | 8 800                          | 190                 | 450                                 |
| 900                          | 5 850                          | 220                 | 670                                 |
| 1 060                        | 9 500                          | 320                 | 600                                 |
| 980                          | 8 400                          | 240                 | 400                                 |
| 1 320                        | 13 200                         | 240                 | 600                                 |
| 1 630                        | 14 700                         | 750                 | 530                                 |
| 1 590                        | 14 000                         | 670                 | 380                                 |
| 1 600                        | 11 400                         | 320                 | 360                                 |
| 1 350                        | 13 400                         | 450                 | 560                                 |
| 950                          | 9 150                          | 530                 | 480                                 |
| 1 310                        | 14 800                         | 360                 | 450                                 |
| 2 360                        | 29 000                         | 1 100               | 430                                 |



**Double direction  
axial angular contact ball bearings**

# Double direction axial angular contact ball bearings

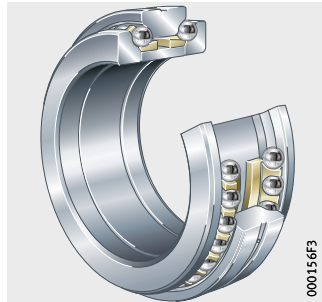


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# Product overview **Double direction axial angular contact ball bearings**

**Super precision bearings for machine tools**

2344, 2347



**Bearings for rotary tables**

Z-5..ASKL2



# Double direction axial angular contact ball bearings



**Features** Double direction axial angular contact ball bearings are available as super precision bearings for machine tools as well as rotary table bearings for drilling rigs.

**Super precision bearings** Double direction axial angular contact ball bearings of series 2344 and 2347 are super precision bearings with restricted tolerances corresponding to class SP. They comprise solid shaft locating washers, a spacer ring, a housing locating washer and ball and cage assemblies with solid brass cages. The bearing parts are matched to each other and can be mounted separately, but must not be interchanged with parts from bearings of the same size. The contact angle is 60°. As a result, these highly rigid axial angular contact ball bearings can support high axial forces in both directions. The double direction precision bearings are therefore particularly suitable for precision spindle bearing arrangements in machine tools. In this case, the axial angular contact ball bearing is combined with a double row cylindrical roller bearing with a tapered bore, which supports the radial forces. Axial angular contact ball bearings in a super precision design of series 2344 can be mounted on the small diameter of the shaft taper, while those of series 2347 can be mounted on the large diameter of the shaft taper. These series have the same nominal outside diameter as cylindrical roller bearings NN30..-AS-K. However, the outside diameter tolerance is designed to give a loose fit when the seats of the axial angular contact ball bearing and the cylindrical roller bearing are machined together.

**Sealing** The super precision bearings are not sealed.

**Lubrication** They can be lubricated using oil or grease. Higher speeds can be achieved with oil lubrication. In order to allow oil to flow between the two rows of balls, the housing locating washer has a lubrication groove and lubrication holes. At high speeds, overlubrication of the radial bearing can be prevented if the installation space is separated from that of the axial angular contact ball bearing.

# Double direction axial angular contact ball bearings

## Bearings for rotary tables

Double direction axial angular contact ball bearings for rotary tables comprise an upper bearing capable of supporting loads and a smaller bearing that fulfils the counterstay function. The bearing unit with low section height has a joint shaft locating washer, a large upper shaft locating washer and small lower shaft locating washer as well as two solid brass cages with balls. The raceways are machined into the bearing washers. Due to the large number of balls, the bearings have high rigidity.

These double direction axial angular contact ball bearings have non-standardised inch size dimensions and designations (Z-5..ASKLZ). The bearings are separable. The bearing washers and the cage can be mounted separately.

Double direction axial angular contact ball bearings for rotary tables can support axial forces in both directions at moderate speeds as well as radial and moment loads. They can therefore be used as single bearings.

### Sealing

Double direction axial angular contact ball bearings for rotary tables are not sealed.

### Lubrication

Due to the vertical bearing axis, we recommend the use of oil lubrication so that all contact points in the bearing are continuously supplied with sufficient quantities of lubricant.

## Operating temperature

The double direction axial angular contact ball bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .

### Cages

In the super precision bearings, each row of rolling elements has a ball-guided solid brass cage. The cage is indicated by the suffix *M* and, together with the lubrication, has a considerable influence on the speed suitability of the bearing.

The solid brass cages in the bearings for rotary tables are guided on the shaft locating washer or on the housing locating washer.

### Suffixes

Suffixes for available designs of super precision bearings: see table.

## Available designs

| Suffix <sup>1)</sup> | Description                   | Design                                      |
|----------------------|-------------------------------|---|
| M                    | Solid brass cage, ball-guided | Standard                                    |
| SP                   | Restricted tolerance class SP |   |
| UP                   | Restricted tolerance class UP | Special design, available by agreement only |

<sup>1)</sup> The design of the bearings for rotary tables with non-standardised designations (Z-5..ASKLZ) is available by agreement from us.



## Double direction axial angular contact ball bearings

### Equivalent static bearing load

Double direction axial angular contact ball bearings, mounted adjacent to a cylindrical roller bearing, can support axial forces only. This also applies in general to the bearings for rotary tables.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0a}$  kN  
Axial static bearing load.

### Static load safety factor

In order to achieve sufficiently smooth running of the super precision bearings, a static load safety factor  $S_0 \geq 2,5$  is required:

$$S_0 = \frac{C_{0a}}{P_0}$$

$S_0$  –  
Static load safety factor  
 $C_{0a}$  kN  
Basic static load rating, see dimension tables  
 $P_0$  kN  
Equivalent static bearing load.

### Speeds of super precision bearings

Double direction axial angular contact ball bearings of a super precision design are suitable for high speeds. Under certain circumstances, the high values may not be achieved if the cylindrical roller bearing arranged adjacent to the axial angular contact ball bearing is preloaded.



The limiting speeds  $n_G$  given in the dimension tables are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

### Preload of super precision bearings

The preload is determined by the spacer ring arranged between the two shaft locating washers.

### Design of bearing arrangements for super precision bearings Shaft and housing tolerances

Guide values for the machining tolerances of the bearing seats, see Catalogue SP 1, Super Precision Bearings.

### Mounting dimensions

The dimension tables give the maximum dimensions of the radii  $r_a$  and the diameters of the abutment surfaces  $d_a, D_a$ .





**Accuracy**  
**Bearing series 2344, 2347**

The dimensional and running tolerances of the super precision bearings correspond to tolerance class SP according to Schaeffler, see tables.

Bearings to tolerance class UP are available by agreement.

**Tolerances**  
**for shaft locating washer**

| Bore |       | Bore deviation            |      | Variation | Wall thickness variation | Height deviation    |                  |
|------|-------|---------------------------|------|-----------|--------------------------|---------------------|------------------|
| d    | mm    | $\Delta_{dmp}$<br>$\mu m$ |      |           |                          | $V_{dp}$<br>$\mu m$ | $S_i$<br>$\mu m$ |
| over | incl. | min.                      | max. |           |                          | min.                | max.             |
| 180  | 250   | -22                       | 0    | 17        | 5                        | -400                | +175             |
| 250  | 315   | -25                       | 0    | 19        | 7                        | -450                | +200             |
| 315  | 400   | -30                       | 0    | 22        | 7                        | -600                | +250             |
| 400  | 500   | -35                       | 0    | 26        | 9                        | -750                | +300             |

**Tolerances**  
**for housing locating washer**

| Outside diameter |       | Outside diameter deviation |      | Variation | Wall thickness variation   |
|------------------|-------|----------------------------|------|-----------|--|
| D                | mm    | $\Delta_{Dmp}$<br>$\mu m$  |      |           |  |
| over             | incl. | min.                       | max. |           |  |
| 250              | 315   | -73                        | -41  | 12        | The wall thickness variation $S_e$ for the housing locating washer is identical to $S_i$ for the shaft locating washer |
| 315              | 400   | -82                        | -46  | 13        |  |
| 400              | 500   | -90                        | -50  | 15        |  |
| 500              | 630   | -99                        | -55  | 16        |  |

# Double direction axial angular contact ball bearings

## Bearings for rotary tables

The normal tolerances of the bearings for rotary tables are given in the following tables.

### Tolerances for shaft locating washer

| Bore<br>d<br>mm |       | Bore deviation<br>$\Delta_{dmp}$<br>$\mu\text{m}$ |      |
|-----------------|-------|---|------|
| over            | incl. |   |      |
| 500             | 630   | 0   | -51  |
| 630             | 800   | 0   | -76  |
| 800             | 1 000 | 0   | -102 |
| 1 000           | 1 250 | 0   | -127 |
| 1 250           | 1 600 | 0   | -165 |

### Tolerances for housing locating washer

| Outside diameter<br>D<br>mm |       | Outside diameter deviation<br>$\Delta_{Dmp}$<br>$\mu\text{m}$ |      |
|-----------------------------|-------|---|------|
| over                        | incl. |   |      |
| 630                         | 800   | 0   | -76  |
| 800                         | 1 000 | 0   | -102 |
| 1 000                       | 1 250 | 0   | -127 |
| 1 250                       | 1 600 | 0   | -165 |

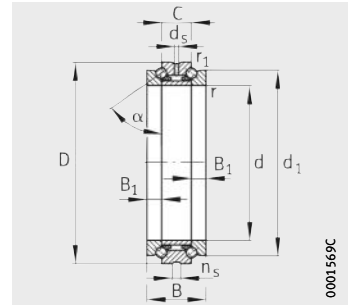
### Tolerances for nominal bearing height

| Bore<br>d<br>mm |       | Deviation of nominal bearing height<br>$\Delta_{T5}$<br>$\mu\text{m}$ |      |
|-----------------|-------|---|------|
| over            | incl. |   |      |
| 500             | 630   | +381  | -381 |
| 630             | 800   | +381  | -381 |
| 800             | 1 000 | +381  | -381 |
| 1 000           | 1 250 | +381  | -381 |
| 1 250           | 1 600 | +381  | -381 |



# Axial angular contact ball bearings

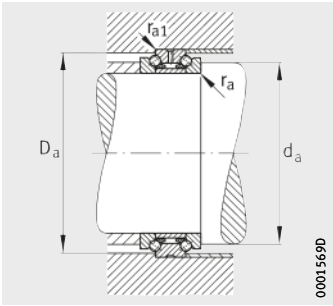
Double direction  
Super precision bearings



Contact angle  $\alpha = 60^\circ$

**Dimension table** - Dimensions in mm

| Designation   | Mass<br>m<br>≈kg | Dimensions |     |     |     |                |                |           |                        |                |                |
|---------------|------------------|------------|-----|-----|-----|----------------|----------------|-----------|------------------------|----------------|----------------|
|               |                  | d          | D   | B   | C   | d <sub>1</sub> | B <sub>1</sub> | r<br>min. | r <sub>1</sub><br>min. | d <sub>s</sub> | n <sub>s</sub> |
| 234444-M-SP   | 36,9             | 220        | 340 | 144 | 72  | 304            | 36             | 3         | 1,1                    | 9,5            | 17,7           |
| 234744-M-SP   | 35,3             | 228        | 340 | 144 | 72  | 304            | 36             | 3         | 1,1                    | 9,5            | 17,7           |
| 234448-M-SP   | 38,9             | 240        | 360 | 144 | 72  | 322            | 36             | 3         | 1,1                    | 9,5            | 17,7           |
| 234748-M-SP   | 37,2             | 248        | 360 | 144 | 72  | 322            | 36             | 3         | 1,1                    | 9,5            | 17,7           |
| 234452-M-SP   | 56,5             | 260        | 400 | 164 | 82  | 354            | 41             | 4         | 1,5                    | 9,5            | 17,7           |
| 234752-M-SP   | 54,1             | 269        | 400 | 164 | 82  | 354            | 41             | 4         | 1,5                    | 9,5            | 17,7           |
| 234456-M-SP   | 57,1             | 280        | 420 | 164 | 82  | 374            | 41             | 4         | 1,5                    | 9,5            | 17,7           |
| 234756-M-SP   | 54,5             | 289        | 420 | 164 | 82  | 374            | 41             | 4         | 1,5                    | 9,5            | 17,7           |
| 234460-M-SP   | 90,7             | 300        | 460 | 190 | 95  | 406            | 47,5           | 4         | 1,5                    | 9,5            | 17,7           |
| 234760-M-SP   | 86,5             | 310        | 460 | 190 | 95  | 406            | 47,5           | 4         | 1,5                    | 9,5            | 17,7           |
| 234464-M-SP   | 90,3             | 320        | 480 | 190 | 95  | 426            | 47,5           | 4         | 1,5                    | 9,5            | 17,7           |
| 234764-M-SP   | 86,5             | 330        | 480 | 190 | 95  | 426            | 47,5           | 4         | 1,5                    | 9,5            | 17,7           |
| 234468-M-SP   | 122              | 340        | 520 | 212 | 106 | 459            | 53             | 4         | 1,5                    | 9,5            | 17,7           |
| 234768-M-SP   | 117              | 350        | 520 | 212 | 106 | 459            | 53             | 4         | 1,5                    | 9,5            | 17,7           |
| 234472-M-SP   | 128              | 360        | 540 | 212 | 106 | 479            | 53             | 4         | 1,5                    | 9,5            | 17,7           |
| 234772-M-SP   | 123              | 370        | 540 | 212 | 106 | 479            | 53             | 4         | 1,5                    | 9,5            | 17,7           |
| 234476-M-SP   | 133              | 380        | 560 | 212 | 106 | 499            | 53             | 4         | 1,5                    | 9,5            | 17,7           |
| 234776-M-SP   | 128              | 390        | 560 | 212 | 106 | 499            | 53             | 4         | 1,5                    | 9,5            | 17,7           |
| 234480-M-SP   | 198              | 400        | 600 | 236 | 118 | 532            | 59             | 5         | 2                      | 9,5            | 17,7           |
| 234780-M-SP   | 187              | 410        | 600 | 236 | 118 | 532            | 59             | 5         | 2                      | 9,5            | 17,7           |
| 2344/500-M-SP | 307              | 500        | 720 | 256 | 128 | 650            | 64             | 6         | 3                      | 9,5            | 17,7           |
| 2347/500-M-SP | 283              | 515        | 720 | 256 | 128 | 650            | 64             | 6         | 3                      | 9,5            | 17,7           |



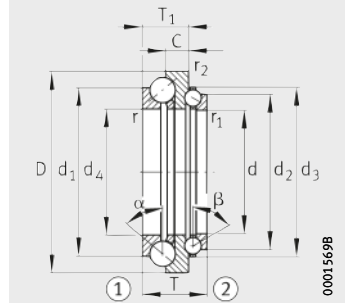
Mounting dimensions



| Mounting dimensions |              |               |                  | Basic load ratings  |                         | Fatigue limit load<br>$C_{ua}$<br>kN | Limiting speed                    |                                |
|---------------------|--------------|---------------|------------------|---------------------|-------------------------|--------------------------------------|-----------------------------------|--------------------------------|
| $d_a$<br>h12        | $D_a$<br>H12 | $r_a$<br>max. | $r_{a1}$<br>max. | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |                                      | $n_G$ grease<br>$\text{min}^{-1}$ | $n_G$ oil<br>$\text{min}^{-1}$ |
| 269                 | 318          | 2,5           | 1                | 340                 | 1 330                   | 71                                   | 1 600                             | 2 200                          |
| 269                 | 318          | 2,5           | 1                | 340                 | 1 330                   | 71                                   | 1 600                             | 2 200                          |
| 289                 | 338          | 2,5           | 1                | 350                 | 1 420                   | 73                                   | 1 500                             | 2 000                          |
| 289                 | 338          | 3             | 1                | 350                 | 1 420                   | 73                                   | 1 500                             | 2 000                          |
| 317,5               | 374,5        | 3             | 1,5              | 400                 | 1 680                   | 83                                   | 1 400                             | 1 900                          |
| 317,5               | 374,5        | 3             | 1,5              | 400                 | 1 680                   | 83                                   | 1 400                             | 1 900                          |
| 337,5               | 394,5        | 3             | 1,5              | 415                 | 1 790                   | 86                                   | 1 300                             | 1 800                          |
| 337,5               | 394,5        | 3             | 1,5              | 415                 | 1 790                   | 86                                   | 1 300                             | 1 800                          |
| 366                 | 428,5        | 3             | 1,5              | 480                 | 2 170                   | 99                                   | 1 200                             | 1 700                          |
| 366                 | 428,5        | 3             | 1,5              | 480                 | 2 170                   | 99                                   | 1 200                             | 1 700                          |
| 386                 | 448,5        | 3             | 1,5              | 495                 | 2 310                   | 103                                  | 1 200                             | 1 700                          |
| 386                 | 448,5        | 3             | 1,5              | 495                 | 2 310                   | 103                                  | 1 200                             | 1 700                          |
| 413                 | 485,5        | 3             | 1,5              | 580                 | 2 850                   | 124                                  | 1 100                             | 1 600                          |
| 413                 | 485,5        | 3             | 1,5              | 580                 | 2 850                   | 124                                  | 1 100                             | 1 600                          |
| 433                 | 505,5        | 3             | 1,5              | 590                 | 2 950                   | 125                                  | 1 000                             | 1 500                          |
| 433                 | 505,5        | 3             | 1,5              | 590                 | 2 950                   | 125                                  | 1 000                             | 1 500                          |
| 453                 | 525,5        | 3             | 1,5              | 610                 | 3 150                   | 130                                  | 1 000                             | 1 500                          |
| 453                 | 525,5        | 4             | 1,5              | 610                 | 3 150                   | 130                                  | 1 000                             | 1 500                          |
| 480                 | 561,5        | 4             | 2                | 680                 | 3 650                   | 147                                  | 900                               | 1 300                          |
| 480                 | 561,5        | 4             | 2                | 680                 | 3 650                   | 147                                  | 900                               | 1 300                          |
| 591                 | 680          | 6             | 3                | 800                 | 4 800                   | 174                                  | 750                               | 1 000                          |
| 591                 | 680          | 6             | 3                | 800                 | 4 800                   | 174                                  | 750                               | 1 000                          |

# Axial angular contact ball bearings

Double direction  
For rotary tables



**Dimension table** - Dimensions in mm

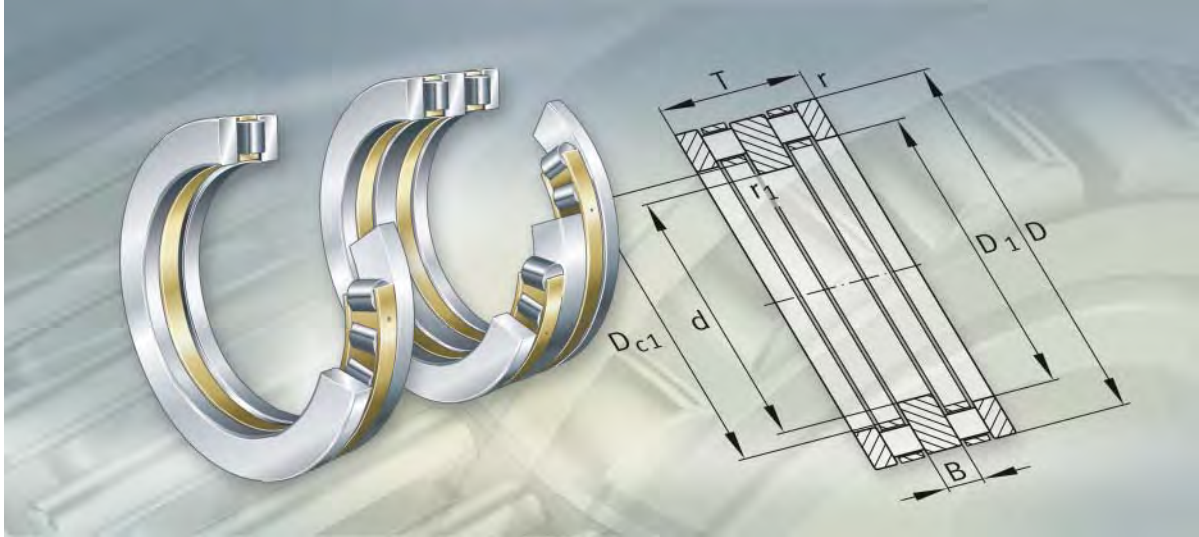
| Designation           | Mass<br>m<br>≈kg | Dimensions       |           |         |                |        |                |                |
|-----------------------|------------------|------------------|-----------|---------|----------------|--------|----------------|----------------|
|                       |                  | d                | D         | T       | T <sub>1</sub> | C      | d <sub>1</sub> | d <sub>2</sub> |
| <b>Z-542060.ASKLZ</b> | 175              | <b>507,9</b>     | 742,95    | 170,3   | 127            | 63,5   | 679,5          | 587,4          |
| <b>Z-542475.ASKLZ</b> | 320              | <b>786,917</b>   | 1 006,2   | 197,74  | 139,547        | 69,85  | 901,7          | 999,2          |
| <b>Z-563286.ASKLZ</b> | 624              | <b>1 371,473</b> | 1 597,025 | 248,412 | 168,275        | 78,588 | 1 489,1        | 1 536,7        |



|         |         |             |               |               | Contact angle |          | Basic load ratings  |                         |                     |                         |
|---------|---------|-------------|---------------|---------------|---------------|----------|---------------------|-------------------------|---------------------|-------------------------|
|         |         |             |               |               | $\alpha$      | $\beta$  | Bearing ①           |                         | Bearing ②           |                         |
| $d_3$   | $d_4$   | $r$<br>min. | $r_1$<br>min. | $r_2$<br>min. | $^\circ$      | $^\circ$ | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |
| 616     | 507,9   | 5           | 2,5           | 2             | 45            | 60       | 830                 | 3 800                   | 390                 | 1 760                   |
| –       | 792     | 5           | 5             | 1,8           | 50            | 60       | 1 160               | 7 650                   | 800                 | 5 600                   |
| 1 481,1 | 1 374,6 | 5           | 5             | 5             | 50            | 60       | 1 460               | 13 700                  | 915                 | 8 800                   |



**FAG**



## Axial cylindrical roller bearings

Single direction

Double direction



# Axial cylindrical roller bearings

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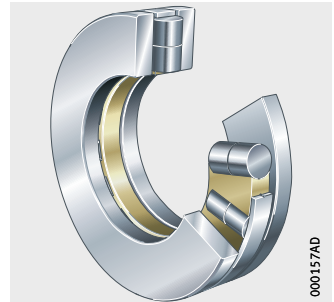
# Product overview Axial cylindrical roller bearings

**Single direction**  
Single row or double row

811, 812, Z-5..AR1

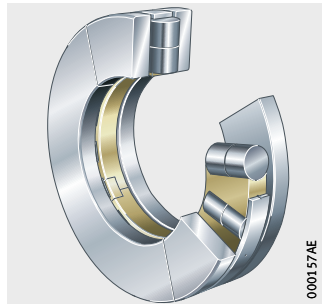


894, Z-5..AR1



**Split**  
Double row or triple row

Z-5..AR1-01



**Double direction**

Z-5..AR2



# Axial cylindrical roller bearings

**Features** Axial cylindrical roller bearings have a low axial section height, high load capacity and high rigidity. Depending on the design, they can support axial forces in one direction or in both directions. Radial forces must be supported by separate means.

**Single direction bearings** Single direction axial cylindrical roller bearings comprise an axial cylindrical roller and cage assembly, an externally centred housing locating washer and an internally centred shaft locating washer. The bore diameter, outside diameter and running surface of the housing locating washer and the shaft locating washer are precision machined.

The bearings can support axial forces in one direction.

Bearings 811, 812 are of a single row design and correspond to DIN 722/ISO 104, bearings 894 are of a double row design to DIN 616/ISO 104.

Bearings with the designation Z-5..AR have non-standardised dimensions and designations.

**Split bearings** Split axial cylindrical roller bearings are used for bearing positions that are difficult to access. They are mounted, for example, together with split radial cylindrical roller bearings in air preheaters. The bearings have two or three rows of rollers. The main dimensions and designations (Z-5..AR) of these bearings are not standardised.

**Double direction bearings** Double direction axial cylindrical roller bearings comprise two axial cylindrical roller and cage assemblies, two externally centred housing locating washers and an internally centred intermediate washer. The bore diameter, outside diameter and running surface of the housing locating washers and the intermediate washer are precision machined. The intermediate washer is guided on the shaft and must be rigidly clamped in place.

Double direction axial cylindrical roller bearings can support axial forces in both directions.

The main dimensions and designations (Z-5..AR) of these bearings are not standardised.



# Axial cylindrical roller bearings

**Operating temperature** Axial cylindrical roller bearings and axial cylindrical roller and cage assemblies can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .

**Cages** The bearings generally have brass cages. These are indicated in bearings of series 811 and 812 as well as 894 by the suffix M. We can provide information on the cage design in special bearings by agreement.

**Suffixes** Suffixes for available designs of standardised bearings: see table.

**Available designs**

| Suffix <sup>1)</sup> | Description  | Design                                      |
|----------------------|--|---|
| M                    | Brass cage   | Standard                                    |
| P5                   | High dimensional, geometrical and running accuracy | Special design, available by agreement only |

<sup>1)</sup> The design of the bearings with non-standardised designations (Z-5) is available by agreement from us.

**Design and safety guidelines**  
**Equivalent dynamic bearing load**

Axial cylindrical roller bearings can support axial forces only. For bearings under dynamic loading, the following applies:

$$P = F_a$$

P kN  
 Equivalent dynamic bearing load  
 F<sub>a</sub> kN  
 Axial dynamic bearing load.



**Equivalent static bearing load**

Axial cylindrical roller bearings can support axial forces only. For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

P<sub>0</sub> kN  
 Equivalent static bearing load  
 F<sub>0a</sub> kN  
 Axial static bearing load.

**Minimum axial load**

In order to ensure reliable operation, the minimum axial load F<sub>a min</sub> in accordance with the equation must be applied:

$$F_{a \min} = 0,0005 \cdot C_{0a} + k_a \left( \frac{C_{0a} \cdot n}{10^8} \right)^2$$

F<sub>a min</sub> N  
 Minimum axial load  
 k<sub>a</sub> –  
 Factor for determining the minimum load, see table  
 C<sub>0a</sub> N (observe the dimension)  
 Basic static load rating  
 n min<sup>-1</sup>  
 Speed.

**Factor k<sub>a</sub>**

| Series | Factor k <sub>a</sub> <sup>1)</sup> |
|--------|-------------------------------------|
| 811    | 1,4                                 |
| 812    | 0,9                                 |
| 894    | 0,5                                 |

<sup>1)</sup> We can provide k<sub>a</sub> values for non-standardised bearings by agreement.

# Axial cylindrical roller bearings

## Limiting speed



The limiting speeds  $n_G$  given in the product tables are valid for oil lubrication. With grease lubrication, the permissible value is 25% of the value given in the table.

## Design of adjacent parts

Axial bearing washers must be fully supported over their entire surface.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

The radial cage guidance surfaces must be precision machined and wear-resistant ( $R_{z,4}$  ( $R_a0,8$ )).



If axial cylindrical roller and cage assemblies run directly on the adjacent construction, the running surfaces must be produced as rolling bearing raceways.

The surface hardness of the raceway must be 670 HV + 70 HV and the hardening depth CHD or SHD must be sufficiently deep.

## Tolerances for shafts and housing bores

Tolerances for shafts and housing bores: see table.

### Shaft and housing bore tolerances

| Bearing component       |              | Shaft tolerance | Bore tolerance |
|-------------------------|--------------|-----------------|----------------|
| Cage                    | Shaft guided | h8              | –              |
| Housing locating washer | –            | –               | H9             |
| Shaft locating washer   | –            | h8              | –              |

## Orientation of washers



The axial bearing washers must be fitted with the raceway side facing the rolling elements.

On housing locating washers, the raceway side is indicated by the smaller chamfer on the outside diameter.

On shaft locating washers, the raceway side is indicated by the smaller chamfer on the bore diameter.

## Accuracy

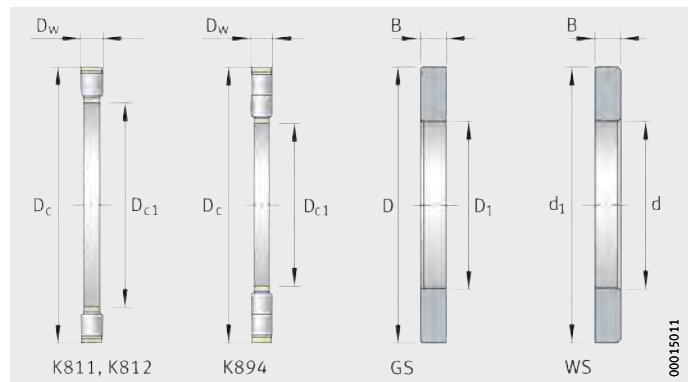
The dimensional and running tolerances of axial bearing washers GS and WS correspond to tolerance class PN to DIN 620.

Tolerances for the bore diameter and outside diameter as well as the width of the bearing components are shown in the table and *Figure 1*.

## Tolerances for bearing components

| Series                  | Tolerance |            |                  |            |        |                |
|-------------------------|-----------|------------|------------------|------------|--------|----------------|
|                         | Bore      |            | Outside diameter |            | Height |                |
| K811<br>K812<br>K894    | $D_{c1}$  | $E11^{1)}$ | $D_c$            | $a13^{1)}$ | $D_w$  | to DIN 5 402-1 |
| GS811<br>GS812<br>GS894 | $D_1$     | –          | $D$              | to DIN 620 | $B$    | $h11$          |
| WS811<br>WS812<br>WS894 | $d$       | to DIN 620 | $d_1$            | –          | $B$    | $h11$          |

1) Deviation from mean diameter.

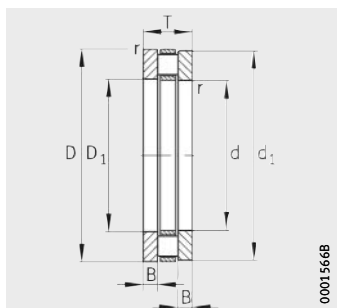


*Figure 1*  
Bearing components

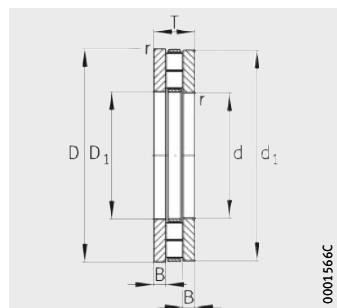
We can provide the tolerances for non-standardised bearings by agreement.

# Axial cylindrical roller bearings

Single direction  
Single row and double row



Design 1  
Single row

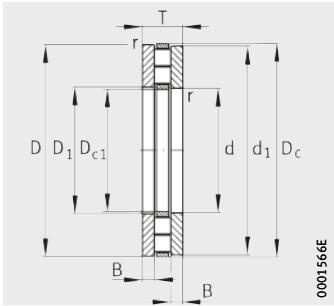


Design 2  
Double row

**Dimension table** - Dimensions in mm

| Designation | Design | Mass<br>m<br>≈kg | Dimensions |     |     |      |           |                |
|-------------|--------|------------------|------------|-----|-----|------|-----------|----------------|
|             |        |                  | d          | D   | T   | B    | r<br>min. | D <sub>1</sub> |
| 89432-M     | 2      | 42               | 160        | 320 | 95  | 31,5 | 5         | 164            |
| 89434-M     | 2      | 51,9             | 170        | 340 | 103 | 34,5 | 5         | 174            |
| 89436-M     | 2      | 60               | 180        | 360 | 109 | 36,5 | 5         | 184            |
| 89438-M     | 2      | 72,1             | 190        | 380 | 115 | 38,5 | 5         | 195            |
| 89440-M     | 2      | 82,6             | 200        | 400 | 122 | 41   | 5         | 205            |
| 89444-M     | 2      | 90,1             | 220        | 420 | 122 | 41   | 6         | 225            |
| 81248-M     | 1      | 26,2             | 240        | 340 | 78  | 23   | 2,1       | 244            |
| 89448-M     | 2      | 95,9             | 240        | 440 | 122 | 41   | 6         | 245            |
| 81152-M     | 1      | 9,08             | 260        | 320 | 45  | 13,5 | 1,5       | 263            |
| 81252-M     | 1      | 28,6             | 260        | 360 | 79  | 23,5 | 2,1       | 264            |
| 89452-M     | 2      | 125              | 260        | 480 | 132 | 44   | 6         | 265            |
| 81156-M     | 1      | 12,6             | 280        | 350 | 53  | 15,5 | 1,5       | 283            |
| 81256-M     | 1      | 31               | 280        | 380 | 80  | 24   | 2,1       | 284            |
| 89456-M     | 2      | 159              | 280        | 520 | 145 | 48,5 | 6         | 285            |
| Z-548745.AR | 1      | 52,2             | 285        | 430 | 95  | 25   | 4         | 285            |
| 81160-M     | 1      | 19,4             | 300        | 380 | 62  | 18,5 | 2         | 304            |
| 81260-M     | 1      | 48,25            | 300        | 420 | 95  | 28,5 | 3         | 304            |
| 89460-M     | 2      | 170              | 300        | 540 | 145 | 48,5 | 6         | 305            |
| 81164-M     | 1      | 20,7             | 320        | 400 | 63  | 19   | 2         | 324            |
| 81264-M     | 1      | 46,9             | 320        | 440 | 95  | 28,5 | 3         | 325            |
| 89464-M     | 2      | 203              | 320        | 580 | 155 | 43,5 | 7,5       | 325            |
| Z-525487.AR | 4      | 70,7             | 330        | 495 | 89  | 28,5 | 2,1       | 330            |
| 81168-M     | 1      | 21,3             | 340        | 420 | 64  | 19,5 | 2         | 344            |
| 81268-M     | 1      | 50               | 340        | 460 | 96  | 29   | 3         | 345            |
| 89468-M     | 2      | 257              | 340        | 620 | 170 | 49   | 7,5       | 345            |
| 81172-M     | 1      | 22,5             | 360        | 440 | 65  | 20   | 2         | 364            |
| 81272-M     | 1      | 71,4             | 360        | 500 | 110 | 32,5 | 4         | 365            |
| 89472-M     | 2      | 267              | 360        | 640 | 170 | 49   | 7,5       | 365            |
| 81176-M     | 1      | 27,7             | 380        | 460 | 65  | 20   | 2         | 384            |
| 81276-M     | 1      | 76,5             | 380        | 520 | 112 | 33,5 | 4         | 385            |
| 89476-M     | 2      | 298              | 380        | 670 | 175 | 49,5 | 7,5       | 385            |
| 81180-M     | 1      | 24,7             | 400        | 480 | 65  | 20   | 2         | 404            |
| 81280-M     | 1      | 79,4             | 400        | 540 | 112 | 33,5 | 4         | 405            |
| 89480-M     | 2      | 353              | 400        | 710 | 185 | 52,5 | 7,5       | 405            |





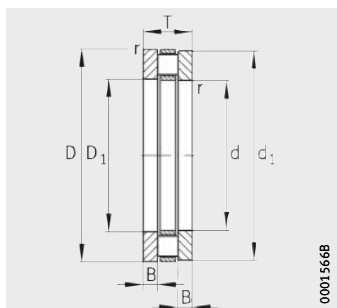
Design 4  
Double row



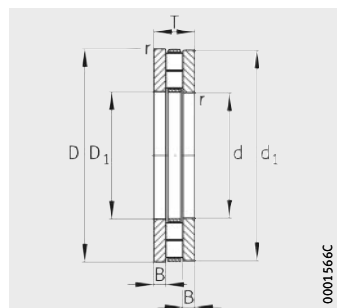
| d <sub>1</sub> | D <sub>c</sub> | D <sub>c1</sub> | Basic load ratings           |                                | Fatigue limit load    | Limiting speed                      | Reference speed                     |
|----------------|----------------|-----------------|------------------------------|--------------------------------|-----------------------|-------------------------------------|-------------------------------------|
|                |                |                 | dyn.<br>C <sub>a</sub><br>kN | stat.<br>C <sub>0a</sub><br>kN | C <sub>ua</sub><br>kN | n <sub>G</sub><br>min <sup>-1</sup> | n <sub>B</sub><br>min <sup>-1</sup> |
| 320            | –              | –               | 1 780                        | 6 500                          | 590                   | 1 170                               | 410                                 |
| 340            | –              | –               | 1 990                        | 7 400                          | 660                   | 1 100                               | 375                                 |
| 360            | –              | –               | 2 210                        | 8 200                          | 720                   | 1 050                               | 335                                 |
| 380            | –              | –               | 2 460                        | 9 200                          | 800                   | 1 010                               | 330                                 |
| 400            | –              | –               | 2 700                        | 10 200                         | 880                   | 960                                 | 305                                 |
| 420            | –              | –               | 2 900                        | 11 500                         | 980                   | 880                                 | 270                                 |
| 335            | –              | –               | 1 370                        | 5 000                          | 445                   | 970                                 | 340                                 |
| 440            | –              | –               | 3 000                        | 12 200                         | 1 030                 | 850                                 | 250                                 |
| 317            | –              | –               | 620                          | 2 650                          | 219                   | 990                                 | 390                                 |
| 355            | –              | –               | 1 440                        | 5 400                          | 475                   | 910                                 | 310                                 |
| 480            | –              | –               | 3 600                        | 14 700                         | 1 200                 | 780                                 | 224                                 |
| 347            | –              | –               | 870                          | 3 650                          | 305                   | 910                                 | 330                                 |
| 375            | –              | –               | 1 460                        | 5 600                          | 485                   | 860                                 | 295                                 |
| 520            | –              | –               | 4 250                        | 17 600                         | 1 420                 | 700                                 | 199                                 |
| 430            | –              | –               | 2 160                        | 7 500                          | 600                   | 900                                 | –                                   |
| 376            | –              | –               | 1 070                        | 4 500                          | 370                   | 840                                 | 300                                 |
| 415            | –              | –               | 1 930                        | 7 300                          | 620                   | 780                                 | 265                                 |
| 540            | –              | –               | 4 350                        | 18 500                         | 1 480                 | 670                                 | 188                                 |
| 396            | –              | –               | 1 100                        | 4 750                          | 385                   | 800                                 | 280                                 |
| 435            | –              | –               | 1 960                        | 7 600                          | 630                   | 740                                 | 250                                 |
| 575            | –              | –               | 5 500                        | 19 900                         | 1 460                 | 640                                 | 185                                 |
| 495            | 493,5          | 318             | 2 360                        | 11 000                         | 810                   | 750                                 | –                                   |
| 416            | –              | –               | 1 130                        | 5 000                          | 400                   | 750                                 | 265                                 |
| 455            | –              | –               | 2 060                        | 8 300                          | 680                   | 710                                 | 229                                 |
| 615            | –              | –               | 6 200                        | 2 270                          | 1 620                 | 600                                 | 171                                 |
| 436            | –              | –               | 1 140                        | 5 100                          | 405                   | 710                                 | 255                                 |
| 495            | –              | –               | 2 700                        | 10 700                         | 860                   | 650                                 | 202                                 |
| 635            | –              | –               | 6 500                        | 24 500                         | 1 720                 | 570                                 | 158                                 |
| 456            | –              | –               | 1 170                        | 5 400                          | 420                   | 680                                 | 238                                 |
| 515            | –              | –               | 2 750                        | 11 100                         | 880                   | 620                                 | 193                                 |
| 665            | –              | –               | 7 000                        | 26 500                         | 1 860                 | 540                                 | 149                                 |
| 476            | –              | –               | 1 200                        | 5 700                          | 435                   | 650                                 | 224                                 |
| 535            | –              | –               | 2 800                        | 11 500                         | 910                   | 600                                 | 184                                 |
| 705            | –              | –               | 7 800                        | 30 000                         | 2 070                 | 520                                 | 138                                 |

# Axial cylindrical roller bearings

Single direction  
Single row and double row



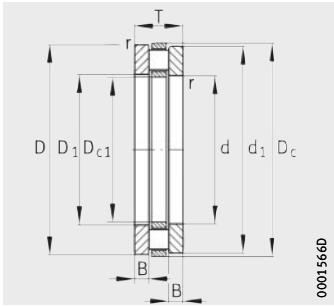
Design 1  
Single row



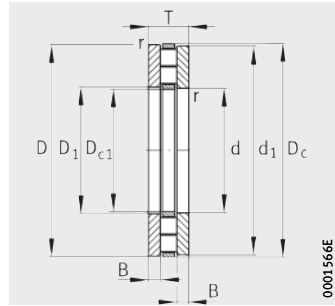
Design 2  
Double row

Dimension table (continued) · Dimensions in mm

| Designation    | Design | Mass<br>m<br>≈kg | Dimensions |       |       |       |           |                |
|----------------|--------|------------------|------------|-------|-------|-------|-----------|----------------|
|                |        |                  | d          | D     | T     | B     | r<br>min. | D <sub>1</sub> |
| 81184-M        | 1      | 25,7             | 420        | 500   | 65    | 20    | 2         | 424            |
| 81284-M        | 1      | 112              | 420        | 580   | 130   | 39    | 5         | 425            |
| 89484-M        | 2      | 369              | 420        | 730   | 185   | 52,5  | 7,5       | 425            |
| Z-525488.AR    | 4      | 71,1             | 431,4      | 571,4 | 89    | 28,5  | 4         | 431,4          |
| 81188-M        | 1      | 40,2             | 440        | 540   | 80    | 24    | 2,1       | 444            |
| 81288-M        | 1      | 117              | 440        | 600   | 130   | 39    | 5         | 445            |
| 89488-M        | 2      | 484              | 440        | 780   | 206   | 59    | 9,5       | 445            |
| Z-560390.01.AR | 3      | 24,3             | 460        | 540   | 54    | 18    | 2         | 463            |
| 81192-M        | 1      | 51,9             | 460        | 560   | 80    | 24    | 2,1       | 464            |
| 81292-M        | 1      | 120              | 460        | 620   | 130   | 39    | 5         | 465            |
| 89492-M        | 2      | 496              | 460        | 800   | 206   | 59    | 9,5       | 465            |
| 81196-M        | 1      | 45,2             | 480        | 580   | 80    | 24    | 2,1       | 484            |
| 81296-M        | 1      | 139              | 480        | 650   | 135   | 39,5  | 5         | 485            |
| 89496-M        | 2      | 619              | 480        | 850   | 224   | 64    | 9,5       | 485            |
| Z-525141.AR    | 4      | 144              | 482,6      | 673,1 | 114,3 | 34,65 | 5         | 482,6          |
| 811/500-M      | 1      | 54,2             | 500        | 600   | 80    | 24    | 2,1       | 505            |
| 812/500-M      | 1      | 144              | 500        | 670   | 135   | 39,5  | 5         | 505            |
| 894/500-M      | 2      | 626              | 500        | 870   | 224   | 64    | 9,5       | 505            |
| Z-560076.AR    | 1      | 12,6             | 530        | 590   | 36    | 11,5  | 2         | 532            |
| 811/530-M      | 1      | 58,2             | 530        | 640   | 85    | 25,5  | 3         | 535            |
| Z-525429.AR    | 1      | 140              | 530        | 710   | 120   | 30    | 4         | 535            |
| 812/530-M      | 1      | 169              | 530        | 710   | 140   | 40    | 5         | 535            |
| 894/530-M      | 2      | 736              | 530        | 920   | 236   | 65,5  | 9,5       | 535            |
| 811/560-M      | 1      | 61,8             | 560        | 670   | 85    | 25,5  | 3         | 565            |
| 812/560-M      | 1      | 202              | 560        | 750   | 150   | 45    | 5         | 565            |
| Z-547234.AR    | 4      | 168              | 572        | 763   | 115   | 35    | 5         | 572            |
| Z-560401.AR    | 3      | 28,4             | 585        | 665   | 54    | 18    | 3         | 588            |
| 811/600-M      | 1      | 65,3             | 600        | 710   | 85    | 25,5  | 3         | 605            |
| 812/600-M      | 1      | 244              | 600        | 800   | 160   | 48    | 5         | 605            |
| Z-545106.AR    | 4      | 176              | 622,3      | 812,8 | 114,3 | 32,15 | 5         | 622,3          |
| 811/630-M      | 1      | 81,2             | 630        | 750   | 95    | 28,5  | 3         | 635            |
| 812/630-M      | 1      | 311              | 630        | 850   | 175   | 53,5  | 6         | 635            |
| Z-529071.AR    | 2      | 1190             | 630        | 1090  | 280   | 77,5  | 15        | 635            |
| Z-529509.AR    | 2      | 323              | 650        | 930   | 130   | 40    | 4         | 650            |



Design 3  
Single row



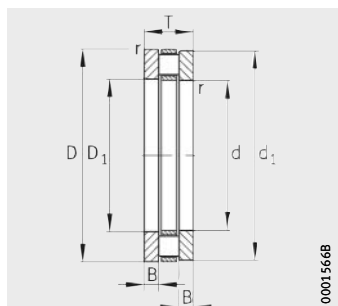
Design 4  
Double row



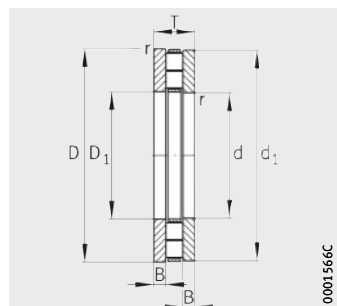
| d <sub>1</sub> | D <sub>c</sub> | D <sub>c1</sub> | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ua</sub><br>kN | Limiting speed<br>n <sub>G</sub><br>min <sup>-1</sup> | Reference speed<br>n <sub>B</sub><br>min <sup>-1</sup> |
|----------------|----------------|-----------------|------------------------------|--------------------------------|---|---|--|
|                |                |                 | dyn.<br>C <sub>a</sub><br>kN | stat.<br>C <sub>0a</sub><br>kN |   |   |  |
| 495            | –              | –               | 1 230                        | 5 900                          | 450   | 620   | 214  |
| 575            | –              | –               | 3 550                        | 14 400                         | 1 020                                       | 560   | 164  |
| 730            | –              | –               | 8 200                        | 32 000                         | 2 200                                       | 500   | 129  |
| 571,4          | 569,5          | 419,5           | 2 280                        | 11 200                         | 760   | 630   | –  |
| 535            | –              | –               | 1 780                        | 8 200                          | 630   | 580   | 189  |
| 595            | –              | –               | 3 600                        | 14 900                         | 1 050                                       | 540   | 158  |
| 780            | –              | –               | 9 800                        | 38 500                         | 2 600                                       | 455   | 114  |
| 537            | 545            | 455,135         | 750                          | 4 000                          | 270   | 630   | –  |
| 555            | –              | –               | 1 840                        | 8 700                          | 650   | 560   | 177  |
| 615            | –              | –               | 3 700                        | 15 500                         | 1 080                                       | 520   | 151  |
| 800            | –              | –               | 9 700                        | 38 500                         | 2 600                                       | 455   | 114  |
| 575            | –              | –               | 1 860                        | 8 900                          | 660   | 540   | 171  |
| 645            | –              | –               | 4 150                        | 17 400                         | 1 200                                       | 500   | 141  |
| 850            | –              | –               | 10 800                       | 42 500                         | 2 800                                       | 430   | 110  |
| 673,1          | 672            | 470,154         | 3 900                        | 18 300                         | 1 210                                       | 530   | –  |
| 595            | –              | –               | 1 910                        | 9 300                          | 690   | 520   | 163  |
| 665            | –              | –               | 4 250                        | 18 000                         | 1 230                                       | 480   | 135  |
| 870            | –              | –               | 10 800                       | 42 500                         | 2 750                                       | 415   | 110  |
| 588            | –              | –               | 465                          | 2 850                          | 179   | 530   | –  |
| 635            | –              | –               | 2 140                        | 10 500                         | 770   | 485   | 155  |
| 705            | –              | –               | 4 650                        | 19 300                         | 1 340                                       | 530   | –  |
| 705            | –              | –               | 4 850                        | 20 500                         | 1 430                                       | 465   | 124  |
| 920            | –              | –               | 12 500                       | 49 000                         | 3 100                                       | 395   | 99   |
| 665            | –              | –               | 2 190                        | 11 000                         | 800   | 465   | 147  |
| 745            | –              | –               | 4 900                        | 21 300                         | 1 430                                       | 440   | 123  |
| 763            | 760            | 560             | 4 250                        | 21 600                         | 1 370                                       | 480   | –  |
| 662            | –              | –               | 765                          | 4 500                          | 285   | 530   | –  |
| 705            | –              | –               | 2 230                        | 11 500                         | 820   | 435   | 139  |
| 795            | –              | –               | 5 500                        | 24 300                         | 1 600                                       | 400   | 112  |
| 812,8          | 825,5          | 610,5           | 5 000                        | 25 500                         | 1 480                                       | 430   | –  |
| 745            | –              | –               | 2 460                        | 12 200                         | 850   | 415   | 139  |
| 845            | –              | –               | 6 000                        | 2 650                          | 1 740                                       | 390   | 110  |
| 1 090          | –              | –               | 16 300                       | 64 000                         | 3 750                                       | 360   | –  |
| 930            | –              | –               | 6 300                        | 35 500                         | 2 200                                       | 380   | –  |

# Axial cylindrical roller bearings

Single direction  
Single row and double row



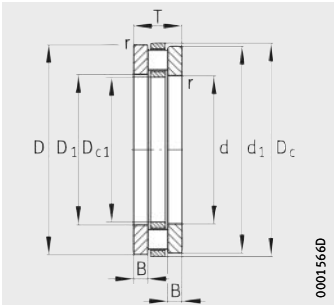
Design 1  
Single row



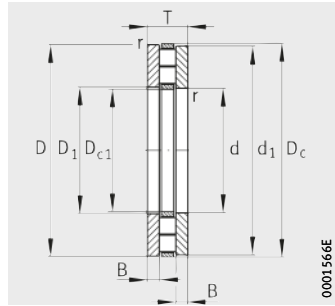
Design 2  
Double row

Dimension table (continued) · Dimensions in mm

| Designation           | Design | Mass<br>m<br>≈kg | Dimensions     |         |         |        |           |                |
|-----------------------|--------|------------------|----------------|---------|---------|--------|-----------|----------------|
|                       |        |                  | d              | D       | T       | B      | r<br>min. | D <sub>1</sub> |
| <b>811/670-M</b>      | 1      | 209              | <b>670</b>     | 800     | 105     | 32,5   | 4         | 675            |
| <b>812/670-M</b>      | 1      | 352              | <b>670</b>     | 900     | 180     | 54     | 6         | 675            |
| <b>Z-534632.AR</b>    | 4      | 196              | <b>673,303</b> | 876,173 | 111,125 | 29,562 | 3         | 673,303        |
| <b>811/710-M</b>      | 1      | 134              | <b>710</b>     | 850     | 112     | 33,5   | 4         | 715            |
| <b>812/710-M</b>      | 1      | 413              | <b>710</b>     | 950     | 190     | 57     | 6         | 715            |
| <b>Z-530311.01.AR</b> | 4      | 343              | <b>711,327</b> | 964,514 | 127,127 | 39,56  | 7,5       | 711,327        |
| <b>811/750-M</b>      | 1      | 160              | <b>750</b>     | 900     | 120     | 36     | 4         | 755            |
| <b>812/750-M</b>      | 1      | 464              | <b>750</b>     | 1000    | 195     | 57,5   | 6         | 755            |
| <b>Z-560389.01.AR</b> | 3      | 43,1             | <b>760</b>     | 840     | 57      | 19     | 4         | 763            |
| <b>811/800-M</b>      | 1      | 170              | <b>800</b>     | 950     | 120     | 36     | 4         | 805            |
| <b>812/800-M</b>      | 1      | 539              | <b>800</b>     | 1060    | 205     | 60     | 7,5       | 805            |
| <b>811/850-M</b>      | 1      | 181              | <b>850</b>     | 1000    | 120     | 36     | 4         | 855            |
| <b>812/850-M</b>      | 1      | 611              | <b>850</b>     | 1120    | 212     | 63,5   | 7,5       | 855            |
| <b>811/900-M</b>      | 1      | 216              | <b>900</b>     | 1060    | 130     | 39     | 5         | 905            |
| <b>812/900-M</b>      | 1      | 697              | <b>900</b>     | 1180    | 220     | 65     | 10        | 905            |
| <b>Z-560391.01.AR</b> | 3      | 63,7             | <b>950</b>     | 1050    | 60      | 20     | 4         | 953            |
| <b>811/950-M</b>      | 1      | 252              | <b>950</b>     | 1120    | 135     | 41,5   | 5         | 955            |
| <b>812/950-M</b>      | 1      | 837              | <b>950</b>     | 1250    | 236     | 70,5   | 10        | 955            |
| <b>811/1000-M</b>     | 1      | 303              | <b>1 000</b>   | 1180    | 140     | 42     | 5         | 1005           |
| <b>812/1000-M</b>     | 1      | 1010             | <b>1 000</b>   | 1320    | 250     | 75     | 12        | 1007           |
| <b>811/1060-M</b>     | 1      | 356              | <b>1 060</b>   | 1250    | 150     | 45     | 5         | 1065           |
| <b>812/1060-M</b>     | 1      | 1210             | <b>1 060</b>   | 1400    | 265     | 77,5   | 9,5       | 1065           |
| <b>811/1120-M</b>     | 1      | 503              | <b>1 120</b>   | 1320    | 160     | 48     | 5         | 1125           |
| <b>811/1180-M</b>     | 1      | 541              | <b>1 180</b>   | 1400    | 175     | 52,5   | 6         | 1185           |
| <b>Z-560392.AR</b>    | 3      | 76,2             | <b>1 205</b>   | 1295    | 64      | 21,5   | 5         | 1208           |
| <b>811/1250-M</b>     | 1      | 538              | <b>1 250</b>   | 1460    | 175     | 52,5   | 6         | 1255           |
| <b>812/1250-M</b>     | 1      | 2040             | <b>1 250</b>   | 1650    | 315     | 92,5   | 12        | 1255           |
| <b>811/1800-M</b>     | 1      | 1430             | <b>1 800</b>   | 2080    | 220     | 65     | 7,5       | 1810           |



Design 3  
Single row



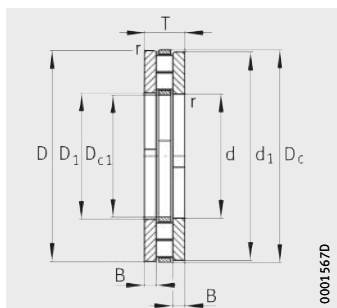
Design 4  
Double row



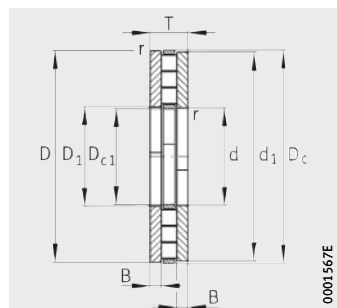
|                |                |                 | Basic load ratings           |                                | Fatigue limit load    | Limiting speed                      | Reference speed                     |
|----------------|----------------|-----------------|------------------------------|--------------------------------|-----------------------|-------------------------------------|-------------------------------------|
| d <sub>1</sub> | D <sub>c</sub> | D <sub>c1</sub> | dyn.<br>C <sub>a</sub><br>kN | stat.<br>C <sub>0a</sub><br>kN | C <sub>ua</sub><br>kN | n <sub>G</sub><br>min <sup>-1</sup> | n <sub>B</sub><br>min <sup>-1</sup> |
| 795            | –              | –               | 2 950                        | 15 300                         | 1 050                 | 390                                 | 119                                 |
| 895            | –              | –               | 6 700                        | 29 500                         | 1 880                 | 365                                 | 102                                 |
| 876,173        | 876            | 674,624         | 5 500                        | 29 000                         | 1 770                 | 530                                 | –                                   |
| 845            | –              | –               | 3 450                        | 17 500                         | 1 190                 | 370                                 | 110                                 |
| 945            | –              | –               | 7 300                        | 32 500                         | 2 080                 | 345                                 | 95                                  |
| 964,514        | 956            | 695,58          | 6 000                        | 34 000                         | 2 110                 | 380                                 | –                                   |
| 895            | –              | –               | 3 850                        | 19 500                         | 1 190                 | 380                                 | 85                                  |
| 995            | –              | –               | 8 100                        | 36 500                         | 2 290                 | 320                                 | 87                                  |
| 837            | 845            | 755             | 1 000                        | 6 550                          | 390                   | 380                                 | –                                   |
| 945            | –              | –               | 4 050                        | 21 500                         | 1 420                 | 330                                 | 94                                  |
| 1 055          | –              | –               | 8 800                        | 39 500                         | 2 410                 | 310                                 | 81                                  |
| 995            | –              | –               | 4 150                        | 22 400                         | 1 470                 | 310                                 | 89                                  |
| 1 115          | –              | –               | 9 200                        | 42 500                         | 2 600                 | 295                                 | 78                                  |
| 1 055          | –              | –               | 4 600                        | 24 700                         | 1 450                 | 295                                 | 85                                  |
| 1 175          | –              | –               | 1 030                        | 48 000                         | 2 850                 | 275                                 | 71                                  |
| 1 047          | 1 055          | 945             | 1 290                        | 9 500                          | 530                   | 320                                 | –                                   |
| 1 115          | –              | –               | 4 950                        | 27 500                         | 1 590                 | 280                                 | 79                                  |
| 1 245          | –              | –               | 11 300                       | 53 000                         | 3 100                 | 255                                 | 68                                  |
| 1 173          | –              | –               | 5 700                        | 32 000                         | 1 830                 | 265                                 | 71                                  |
| 1 313          | –              | –               | 12 100                       | 57 000                         | 3 300                 | 248                                 | 66                                  |
| 1 245          | –              | –               | 6 200                        | 34 000                         | 1 980                 | 249                                 | 70                                  |
| 1 395          | –              | –               | 14 200                       | 66 000                         | 3 750                 | 234                                 | 59                                  |
| 1 315          | –              | –               | 7 000                        | 39 000                         | 2 190                 | 236                                 | 63                                  |
| 1 395          | –              | –               | 7 800                        | 44 000                         | 2 460                 | 223                                 | 60                                  |
| 1 292          | 1 300          | 1 200           | 1 250                        | 9 300                          | 485                   | 240                                 | –                                   |
| 1 455          | –              | –               | 8 100                        | 47 000                         | 2 600                 | 213                                 | 54                                  |
| 1 645          | –              | –               | 19 200                       | 93 000                         | 4 950                 | 195                                 | 47                                  |
| 2 070          | –              | –               | 15 000                       | 95 000                         | 4 750                 | 148                                 | 32                                  |

# Axial cylindrical roller bearings

Split, single direction  
Double row and triple row



Design 1  
Double row



Design 2  
Triple row

**Dimension table** - Dimensions in mm

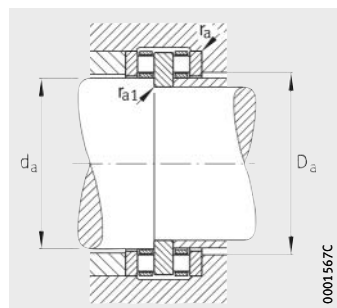
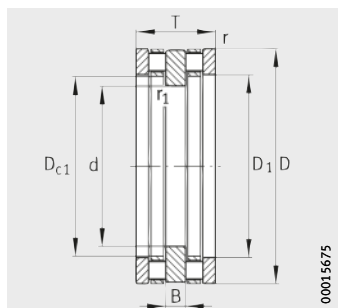
| Designation | Design | Mass<br>m<br>≈kg | Dimensions     |        |       |       |           |
|-------------|--------|------------------|----------------|--------|-------|-------|-----------|
|             |        |                  | d              | D      | T     | B     | r<br>min. |
| Z-543424.AR | 1      | 66,4             | <b>330</b>     | 495,3  | 88,9  | 27,45 | 5         |
| Z-528428.AR | 2      | 233              | <b>355,58</b>  | 660,55 | 133,4 | 44,7  | 5         |
| Z-543509.AR | 2      | 236              | <b>365</b>     | 660,4  | 133,3 | 44,65 | 6         |
| Z-543342.AR | 1      | 144              | <b>425</b>     | 635    | 114,3 | 35,15 | 10        |
| Z-528429.AR | 1      | 258              | <b>475,235</b> | 736,75 | 146,1 | 47,05 | 5         |
| Z-543463.AR | 1      | 265              | <b>482</b>     | 736,6  | 146,1 | 47,05 | 7,5       |
| Z-543809.AR | 2      | 446              | <b>635</b>     | 939,8  | 146   | 48    | 9,5       |



| D <sub>1</sub> | d <sub>1</sub> | D <sub>c</sub> | D <sub>c1</sub> | Basic load ratings           |                                | Fatigue limit load    | Limiting speed                      |
|----------------|----------------|----------------|-----------------|------------------------------|--------------------------------|-----------------------|-------------------------------------|
|                |                |                |                 | dyn.<br>C <sub>a</sub><br>kN | stat.<br>C <sub>0a</sub><br>kN | C <sub>ua</sub><br>kN | n <sub>G</sub><br>min <sup>-1</sup> |
| 330            | 495,3          | 495            | 317,5           | 2 280                        | 10 000                         | 750                   | 750                                 |
| 373,635        | 658,14         | 671            | 356,05          | 4 550                        | 21 600                         | 1 470                 | 600                                 |
| 365            | 658            | 680            | 355,6           | 4 550                        | 21 600                         | 1 470                 | 600                                 |
| 425            | 635            | 635            | 406,4           | 3 800                        | 17 600                         | 1 050                 | 600                                 |
| 475,235        | 736,75         | 745            | 457,735         | 5 200                        | 24 500                         | 1 670                 | 530                                 |
| 482            | 736,6          | 746            | 457,2           | 5 200                        | 24 500                         | 1 670                 | 530                                 |
| 635            | 939,8          | 981,3          | 533,545         | 6 800                        | 39 000                         | 2 370                 | 400                                 |

# Axial cylindrical roller bearings

Double direction



Mounting dimensions

Dimension table - Dimensions in mm

| Designation     | Mass<br>m<br>≈kg | Dimensions |       |     |     |     |                |                |                |                               |
|-----------------|------------------|------------|-------|-----|-----|-----|----------------|----------------|----------------|-------------------------------|
|                 |                  | d          | D     | T   | B   | r   | r <sub>1</sub> | D <sub>1</sub> | d <sub>1</sub> | D <sub>c1</sub> <sup>1)</sup> |
| Z-507120.AR     | 33,9             | 240        | 340   | 120 | 32  | 2,1 | 1,1            | 264            | 338            | 260                           |
| Z-507121.AR     | 35,1             | 260        | 360   | 120 | 32  | 2,1 | 1,1            | 284            | 358            | 280                           |
| Z-507122.AR     | 39,9             | 280        | 380   | 120 | 32  | 2,1 | 1,1            | 304            | 378            | 300                           |
| Z-507122.AR-MBS | 37,3             | 280        | 380   | 120 | 32  | 2,1 | 1,1            | 304            | 378            | 300                           |
| Z-507123.AR     | 60               | 300        | 420   | 146 | 38  | 3   | 1,5            | 330            | 417            | 325                           |
| Z-507124.AR     | 64               | 320        | 440   | 146 | 38  | 3   | 1,5            | 350            | 437            | 345                           |
| Z-507125.AR     | 64,6             | 340        | 460   | 146 | 38  | 3   | 1,5            | 370            | 459            | 365                           |
| Z-507130.AR     | 141              | 440        | 600   | 190 | 50  | 5   | 3              | 485            | 597            | 475                           |
| Z-507131.AR     | 175              | 460        | 620   | 190 | 50  | 5   | 3              | 505            | 617            | 495,135                       |
| Z-507131.AR-MBS | 175              | 460        | 620   | 190 | 50  | 5   | 3              | 505            | 617            | 495,135                       |
| Z-507132.AR     | 182              | 480        | 650   | 206 | 54  | 5   | 3              | 525            | 646            | 515,145                       |
| Z-507132.AR-MBS | 182              | 480        | 650   | 206 | 54  | 5   | 3              | 525            | 646            | 515,145                       |
| Z-507133.AR     | 196              | 500        | 670   | 206 | 54  | 5   | 3              | 545            | 666            | 535                           |
| Z-507134.AR     | 224              | 530        | 710   | 218 | 57  | 5   | 3              | 580            | 706            | 567                           |
| Z-507134.AR-MBS | 224              | 530        | 710   | 218 | 57  | 5   | 3              | 580            | 706            | 567                           |
| Z-507135.AR     | 271              | 560        | 750   | 230 | 60  | 5   | 3              | 615            | 746            | 600                           |
| Z-507136.AR     | 327              | 600        | 800   | 244 | 64  | 5   | 3              | 655            | 796            | 640                           |
| Z-507137.AR     | 411              | 630        | 850   | 264 | 70  | 8   | 5              | 690            | 845            | 675                           |
| Z-507138.AR     | 479              | 670        | 900   | 280 | 75  | 6   | 4              | 735            | 895            | 720                           |
| Z-507140.AR     | 623              | 750        | 1 000 | 300 | 80  | 6   | 4              | 820            | 995            | 805                           |
| Z-507141.AR     | 708              | 800        | 1 060 | 310 | 82  | 7,5 | 5              | 875            | 1 054          | 855                           |
| Z-507142.AR     | 799              | 850        | 1 120 | 320 | 85  | 7,5 | 5              | 930            | 1 114          | 910                           |
| Z-507143.AR     | 938              | 900        | 1 180 | 340 | 90  | 7,5 | 5              | 980            | 1 174          | 960                           |
| Z-507144.AR     | 1 120            | 950        | 1 250 | 360 | 92  | 7,5 | 5              | 1 035          | 1 246          | 1 015                         |
| Z-507145.AR     | 1 330            | 1 000      | 1 320 | 380 | 96  | 9,5 | 6              | 1 090          | 1 316          | 1 070                         |
| Z-507146.AR     | 1 630            | 1 060      | 1 400 | 412 | 102 | 9,5 | 6              | 1 155          | 1 394          | 1 135                         |

1) Tolerance to E11.

2) Shaft tolerances, see table.

## Shaft tolerances

Nominal dimension of shaft  $d_a$  in mm

|       |     |     |     |     |       |
|-------|-----|-----|-----|-----|-------|
| over  | 120 | 300 | 600 | 760 | 960   |
| incl. | 300 | 600 | 760 | 960 | 1 135 |

Deviations in  $\mu\text{m}$

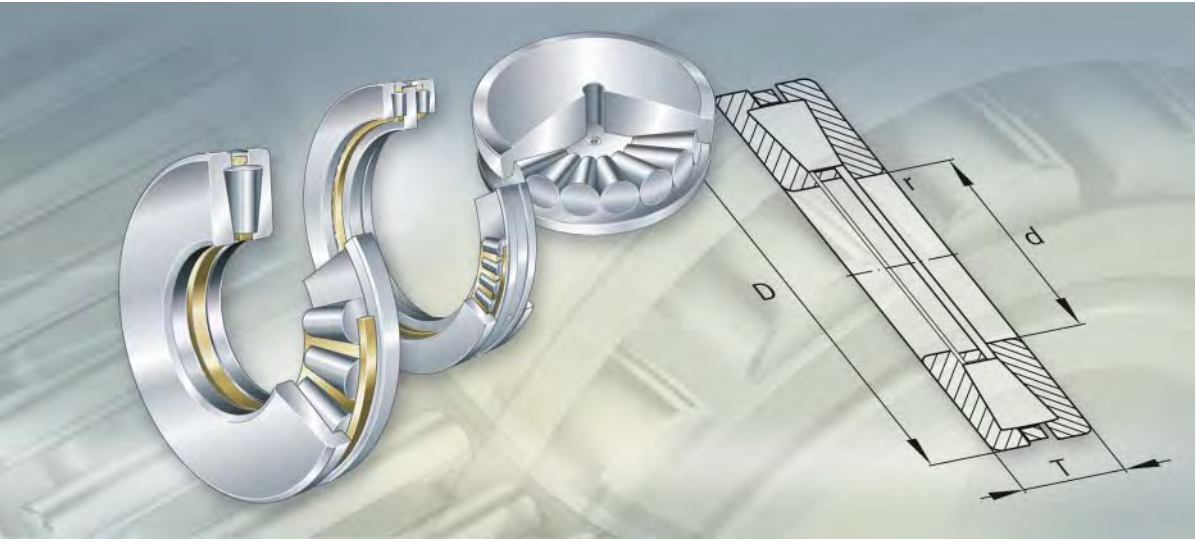
|       |     |     |      |      |      |
|-------|-----|-----|------|------|------|
| upper | 0   | 0   | 0    | 0    | 0    |
| lower | -50 | -70 | -100 | -125 | -150 |





| Mounting dimensions |       |       |          | Basic load ratings |                   | Fatigue limit load | Limiting speed    |
|---------------------|-------|-------|----------|--------------------|-------------------|--------------------|-------------------|
| $d_a^{2)}$          | $D_a$ | $r_a$ | $r_{a1}$ | dyn.<br>$C_a$      | stat.<br>$C_{0a}$ | $C_{ua}$           | $n_G$             |
|                     | max.  | max.  | max.     | kN                 | kN                | kN                 | $\text{min}^{-1}$ |
| 260                 | 274   | 2     | 1        | 880                | 3 350             | 275                | 1 000             |
| 280                 | 294   | 2     | 1        | 950                | 3 750             | 300                | 950               |
| 300                 | 314   | 2     | 1        | 980                | 4 000             | 305                | 900               |
| 300                 | 314   | 2     | 1        | 980                | 4 000             | 305                | 900               |
| 325                 | 341   | 2,5   | 1,5      | 1 290              | 5 200             | 355                | 850               |
| 345                 | 361   | 2,5   | 1,5      | 1 320              | 5 400             | 410                | 800               |
| 365                 | 381   | 2,5   | 1,5      | 1 370              | 5 700             | 430                | 750               |
| 475                 | 498   | 4     | 2,5      | 2 160              | 9 500             | 670                | 560               |
| 495                 | 518   | 4     | 2,5      | 2 240              | 10 200            | 700                | 560               |
| 495                 | 518   | 4     | 2,5      | 2 240              | 10 200            | 700                | 560               |
| 515                 | 539   | 4     | 2,5      | 2 600              | 11 800            | 810                | 530               |
| 515                 | 539   | 4     | 2,5      | 2 600              | 11 800            | 810                | 530               |
| 535                 | 559   | 4     | 2,5      | 2 650              | 12 000            | 830                | 530               |
| 567                 | 592   | 4     | 2,5      | 3 000              | 13 700            | 920                | 480               |
| 567                 | 592   | 4     | 2,5      | 3 000              | 13 700            | 920                | 480               |
| 600                 | 625   | 4     | 2,5      | 3 350              | 15 300            | 1 010              | 450               |
| 640                 | 668   | 4     | 2,5      | 3 650              | 17 000            | 1 120              | 430               |
| 675                 | 706   | 6,5   | 4        | 4 250              | 20 000            | 1 300              | 400               |
| 720                 | 752   | 5     | 3        | 4 550              | 21 600            | 1 380              | 380               |
| 805                 | 840   | 5     | 3        | 5 300              | 26 000            | 1 610              | 340               |
| 855                 | 891   | 6     | 4        | 5 850              | 29 000            | 1 770              | 340               |
| 910                 | 948   | 6     | 4        | 6 100              | 31 500            | 1 830              | 280               |
| 960                 | 999   | 6     | 4        | 6 950              | 35 500            | 2 060              | 280               |
| 1 015               | 1 056 | 6     | 4        | 8 000              | 41 500            | 2 360              | 260               |
| 1 070               | 1 113 | 8     | 5        | 9 000              | 46 500            | 2 600              | 260               |
| 1 135               | 1 185 | 8     | 5        | 9 300              | 49 000            | 2 700              | 240               |





## Axial tapered roller bearings

Single direction

Double direction

For screw-down mechanisms

# Single direction axial tapered roller bearings

## Single direction axial tapered roller bearings ..... 796

Single direction axial tapered roller bearings with two tapered raceways can support very high axial forces in one direction. The bearings are separable. As a result, the rings can be mounted separately. The inch size main dimensions and the designations Z-5..TA1 or F-8..TA1 of these special bearings are not standardised. A typical application for these axial tapered roller bearings is in flush heads for drilling rigs.

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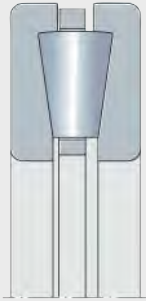
## Double direction axial tapered roller bearings ..... 804

Double direction axial tapered roller bearings can support very high axial forces in both directions. In these ready-to-fit bearings, the axial internal clearance is set by the ring between the housing locating washers. The bearings are used, for example, in blooming stands and section rolling stands. The metric main dimensions and designations Z-5..TA2 of these special bearings are not standardised.

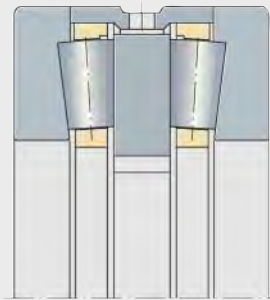
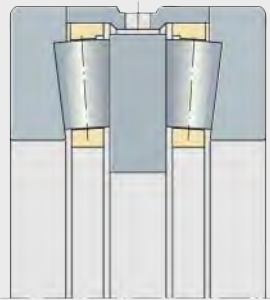
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## Axial tapered roller bearings for screw-down mechanisms ..... 812

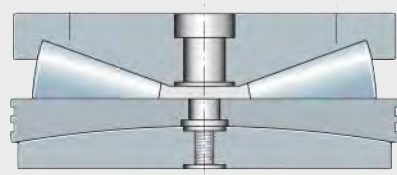
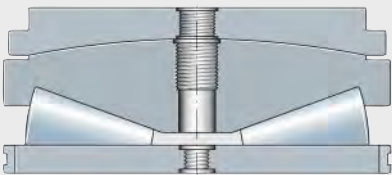
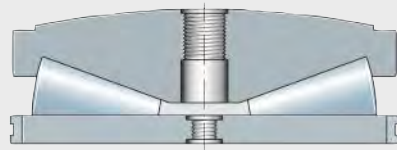
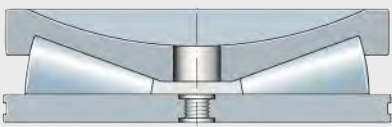
Axial tapered roller bearings for screw-down mechanisms in rolling stands can support extremely high axial forces in one direction. The separable bearings are mounted between the upper chock and the screw-down mechanism. Due to their low friction, these bearings reduce the screw-down forces. Axial tapered roller bearings for screw-down mechanisms have non-standardised dimensions and designations Z-5..TA1 or F-8..TA1. The bearings are available in various designs.



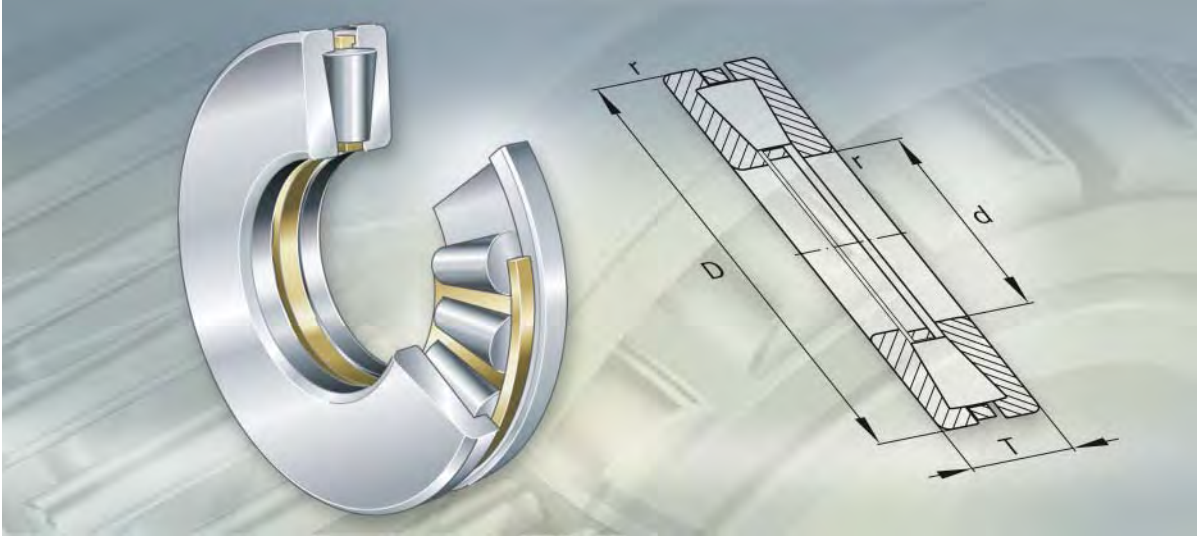
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**Single direction  
axial tapered roller bearings**

# Single direction axial tapered roller bearings

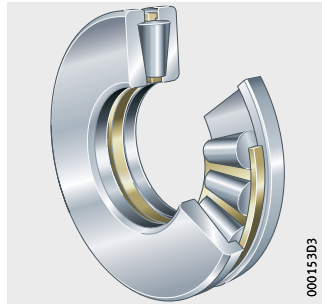
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# Product overview **Single direction axial tapered roller bearings**

**Single direction**

Z-5..TA1-01, F-8..TA1-01





# Single direction axial tapered roller bearings

|                              |   |
|------------------------------|---|
| <b>Features</b>              | <p>Single direction axial tapered roller bearings comprise a shaft locating washer and a housing locating washer, into which tapered raceways are machined, and a cage with tapered rollers.</p> <p>Due to the large number of tapered rollers, the bearings have high rigidity.</p> <p>Single direction axial tapered roller bearings are separable. The bearing washers and the cage with the roller set can be mounted separately.</p> <p>Single direction axial tapered roller bearings have non-standardised dimensions and designations Z-5..TA1 or F-8..TA1.</p> |
| <b>Axial load capacity</b>   | <p>In their main application in flush heads for drilling rigs, the bearings can support very high axial forces (the weight of the rotating drill string) in one direction. The axial counterstay function is performed by a radial tapered roller bearing. As a result, the shaft locating washer cannot lift off if shocks occur in an upward direction.</p>   |
| <b>Sealing</b>               | <p>Single direction axial tapered roller bearings are not sealed.</p>   |
| <b>Lubrication</b>           | <p>Due to the vertical arrangement of the shaft, the single direction axial tapered roller bearings are lubricated with oil.</p>  |
| <b>Operating temperature</b> | <p>Single direction axial tapered roller bearings can be used at operating temperatures from <math>-30\text{ °C}</math> to <math>+150\text{ °C}</math>.</p>   |
| <b>Cage</b>                  | <p>Single direction axial tapered roller bearings have a solid brass cage.</p>  |



# Single direction axial tapered roller bearings

## Design and safety guidelines Equivalent dynamic bearing load

Single direction axial tapered roller bearings can support axial forces only.

For bearings under dynamic loading, the following applies:

$$P = F_a$$

$P$  kN  
Equivalent dynamic bearing load  
 $F_a$  kN  
Axial dynamic bearing load.

## Equivalent static bearing load

Single direction axial tapered roller bearings can support axial forces only.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0a}$  kN  
Axial static bearing load.

## Minimum axial load

At higher speeds, detrimental sliding movements can occur between the rolling elements and the raceways due to centrifugal forces and gyroscopic moments. In order to avoid this, the bearings must be subjected to a minimum load  $F_{a \min}$ . This can be achieved by means of preloading, for example using springs.

We can provide the minimum load factor  $A$  by agreement.

For  $n_{\max}$ , the maximum operating speed must be used.

$$F_{a \min} = A \cdot \left( \frac{n_{\max}}{1000} \right)^2$$

$F_{a \min}$  kN  
Minimum axial load  
 $A$  –  
Minimum load factor  $A$ , values available by agreement  
 $n_{\max}$   $\text{min}^{-1}$   
Maximum operating speed.

**Accuracy** Normal tolerances for single direction axial tapered roller bearings, see tables.

**Tolerances for shaft locating washer**

| Bore<br>d<br>mm |         | Bore deviation<br>$\Delta_{dmp}$<br>$\mu\text{m}$ |   |
|-----------------|---------|---|---|
| over            | incl.   |   |   |
| 76,2            | 304,8   | +25   | 0 |
| 304,8           | 609,6   | +51   | 0 |
| 609,6           | 914,4   | +76   | 0 |
| 914,4           | 1 219,2 | +102  | 0 |



**Tolerances for housing locating washer**

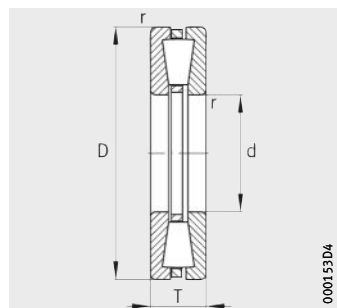
| Outside diameter<br>D<br>mm |         | Outside diameter deviation<br>$\Delta_{Dmp}$<br>$\mu\text{m}$ |   |
|-----------------------------|---------|---|---|
| over                        | incl.   |   |   |
| 152,4                       | 304,8   | +25   | 0 |
| 304,8                       | 609,6   | +51   | 0 |
| 609,6                       | 914,4   | +76   | 0 |
| 914,4                       | 1 219,2 | +102  | 0 |

**Tolerances for nominal bearing height**

| Bore<br>d<br>mm |         | Deviation of nominal bearing height<br>$\Delta_{Ts}$<br>$\mu\text{m}$ |      |
|-----------------|---------|---|------|
| over            | incl.   |   |      |
| 76,2            | 304,8   | +381  | -381 |
| 304,8           | 609,6   | +381  | -381 |
| 609,6           | 914,4   | +381  | -381 |
| 914,4           | 1 219,2 | +381  | -381 |

# Axial tapered roller bearings

Single direction

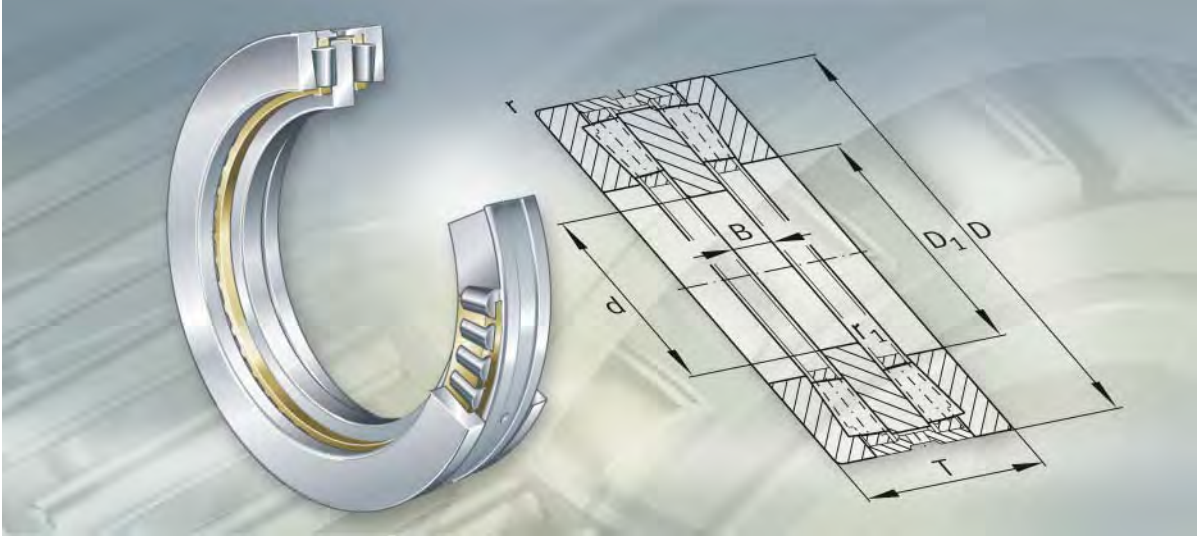


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**Dimension table** - Dimensions in mm

| Designation            | Mass<br>m<br>≈kg | Dimensions     |         |         |           | Basic load ratings           |                                | Fatigue limit load<br>C <sub>ua</sub><br>kN |
|------------------------|------------------|----------------|---------|---------|-----------|------------------------------|--------------------------------|---|
|                        |                  | d              | D       | T       | r<br>min. | dyn.<br>C <sub>a</sub><br>kN | stat.<br>C <sub>0a</sub><br>kN |   |
| <b>Z-535741.01.TA1</b> | 42,4             | <b>174,626</b> | 358,775 | 82,55   | 6,4       | 2 120                        | 9 100                          | 740   |
| <b>Z-547667.TA1</b>    | 47,3             | <b>177,8</b>   | 368,3   | 82,55   | 8         | 2 200                        | 9 100                          | 740   |
| <b>Z-549585.TA1</b>    | 85,9             | <b>177,8</b>   | 431,8   | 101,6   | 3,3       | 3 450                        | 15 100                         | 1 170                                       |
| <b>Z-547712.TA1</b>    | 36,8             | <b>190</b>     | 355,6   | 74,219  | 6,4       | 1 910                        | 8 100                          | 670   |
| <b>Z-514560.TA1</b>    | 64,6             | <b>203,2</b>   | 419,1   | 92,075  | 9,7       | 2 800                        | 12 300                         | 970   |
| <b>Z-547713.TA1</b>    | 91,5             | <b>203,2</b>   | 419,1   | 120,65  | 9,7       | 2 800                        | 12 300                         | 970   |
| <b>Z-547380.TA1</b>    | 62               | <b>228,6</b>   | 431,8   | 88,773  | 9,7       | 2 700                        | 11 900                         | 930   |
| <b>Z-512133.01.TA1</b> | 103              | <b>228,6</b>   | 482,6   | 104,775 | 11,2      | 3 700                        | 16 500                         | 1 240                                       |
| <b>Z-546631.TA1</b>    | 102              | <b>234,95</b>  | 482,6   | 104,775 | 11,2      | 3 700                        | 16 500                         | 1 240                                       |
| <b>Z-513052.01.TA1</b> | 162              | <b>234,95</b>  | 546,1   | 127     | 16        | 4 900                        | 23 000                         | 1 660                                       |
| <b>Z-537504.TA1</b>    | 127              | <b>241,3</b>   | 495,3   | 127     | 8         | 3 650                        | 16 000                         | 1 210                                       |
| <b>Z-547591.TA1</b>    | 145              | <b>254</b>     | 539,75  | 117,475 | 11,2      | 4 500                        | 19 700                         | 1 440                                       |
| <b>Z-539210.TA1</b>    | 165              | <b>273,05</b>  | 552,45  | 133,35  | 8         | 4 400                        | 19 600                         | 1 430                                       |
| <b>Z-539209.TA1</b>    | 265              | <b>273,05</b>  | 577,85  | 177,8   | 10        | 4 950                        | 19 800                         | 1 420                                       |
| <b>Z-539211.TA1</b>    | 226              | <b>273,05</b>  | 603,25  | 146,05  | 8         | 5 400                        | 25 000                         | 1 780                                       |
| <b>Z-546633.TA1</b>    | 216              | <b>279,4</b>   | 603,25  | 136,525 | 11,2      | 6 000                        | 26 500                         | 1 860                                       |
| <b>Z-547931.TA1</b>    | 321              | <b>292,1</b>   | 660,4   | 165,1   | 12,7      | 7 500                        | 32 000                         | 2 190                                       |
| <b>Z-549175.TA1</b>    | 144              | <b>368,3</b>   | 603,25  | 120,65  | 9,7       | 4 150                        | 17 600                         | –   |
| <b>Z-549176.TA1</b>    | 261              | <b>406,4</b>   | 711,2   | 146,05  | 9,7       | 6 700                        | 30 000                         | 2 010                                       |
| <b>Z-533633.01.TA1</b> | 525              | <b>406,4</b>   | 838,2   | 177,8   | 12,7      | 10 000                       | 50 000                         | –   |
| <b>Z-521644.TA1</b>    | 788              | <b>508</b>     | 990,6   | 196,85  | 12,7      | 13 300                       | 72 000                         | 4 400                                       |
| <b>F-807320.TA1</b>    | 630              | <b>1 240</b>   | 1 540   | 140     | 9,7       | 11 000                       | 77 000                         | 4 150                                       |





**Double direction  
axial tapered roller bearings**

# Double direction axial tapered roller bearings

|                                     |   | Page |
|-------------------------------------|---|------|
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# Product overview Double direction axial tapered roller bearings

Double direction

Z-5..TA2





# Double direction axial tapered roller bearings

**Features** Double direction axial tapered roller bearings have a flat shaft locating washer and two housing locating washers. Tapered raceways are machined into the housing locating washers. A spacer ring between the housing locating washers guides the two cages with tapered rollers and sets the axial internal clearance. Due to the large number of tapered rollers, the bearings have high rigidity.

Double direction axial tapered roller bearings have non-standardised metric dimensions and designations Z-5..TA2. The bearings are separable.

The bearing washers and the cages with rollers can be mounted separately.

Bearings of Design 2 have, in contrast to those of Design 1, a retaining slot in the shaft locating washer, see section Design of bearing arrangements, page 808.



**Axial load capacity** Double direction axial tapered roller bearings can support very high axial forces in both directions at moderate speeds.

The bearings are mounted in preference in blooming stands and section rolling stands, in which multi-row cylindrical roller bearings are used as radial bearings.

**Operating temperature** The double direction axial tapered roller bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .

**Cage** The solid brass cages are guided by the spacer ring which is arranged between the two housing locating washers.

# Double direction axial tapered roller bearings

## Design and safety guidelines Equivalent dynamic bearing load

Double direction axial tapered roller bearings can support axial forces only.

For bearings under dynamic loading, the following applies:

$$P = F_a$$

$P$  kN  
Equivalent dynamic bearing load  
 $F_a$  kN  
Axial dynamic bearing load.

## Equivalent static bearing load

Double direction axial tapered roller bearings can support axial forces only.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

$P_0$  kN  
Equivalent static bearing load  
 $F_{0a}$  kN  
Axial static bearing load.

## Minimum axial load

The spacer ring between the housing locating washers is matched such that slight preload is present once the cover screws on the chock have been tightened.

## Design of bearing arrangements Shaft and housing tolerances

The double direction axial tapered roller bearings are generally mounted loose on the journal and also located loose in the chocks. Bearings of Design 2 have a retaining slot in the shaft locating washer. Feather keys, for example, are then used to ensure that this washer also rotates reliably.

If the bearings are located on a sleeve for easier mounting, the shaft locating washer should have a slight interference fit.

## Mounting dimensions

The dimension tables give the maximum value of the radii  $r_a$  and  $r_{a1}$  and the diameters of the abutment shoulders  $d_a$ .

**Accuracy** The diameter tolerances correspond to tolerance class PN to DIN 620-3. Please contact us for information on the section height tolerances.

**Tolerances for shaft locating washer**

| Bore<br>d<br>mm |       | Bore deviation<br>$\Delta_{dmp}$<br>$\mu\text{m}$ |      |
|-----------------|-------|---|------|
| over            | incl. |   |      |
| 180             | 250   | 0   | -30  |
| 250             | 315   | 0   | -35  |
| 315             | 400   | 0   | -40  |
| 400             | 500   | 0   | -45  |
| 500             | 630   | 0   | -50  |
| 630             | 800   | 0   | -75  |
| 800             | 1000  | 0   | -100 |

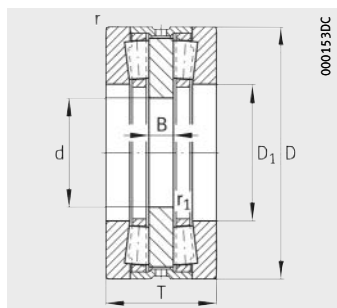


**Tolerances for housing locating washer**

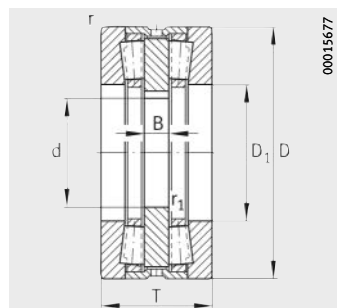
| Outside diameter<br>D<br>mm |       | Outside diameter deviation<br>$\Delta_{Dmp}$<br>$\mu\text{m}$ |      |
|-----------------------------|-------|---|------|
| over                        | incl. |   |      |
| 180                         | 250   | 0   | -30  |
| 250                         | 315   | 0   | -35  |
| 315                         | 400   | 0   | -40  |
| 400                         | 500   | 0   | -45  |
| 500                         | 630   | 0   | -50  |
| 630                         | 800   | 0   | -75  |
| 800                         | 1000  | 0   | -100 |

# Axial tapered roller bearings

Double direction  
With intermediate ring



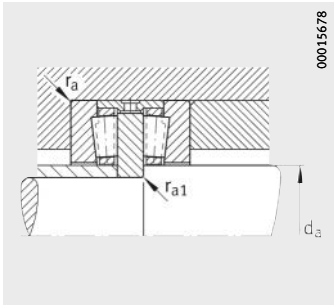
Design 1



Design 2  
With retaining slot  
in the shaft locating washer

Dimension table - Dimensions in mm

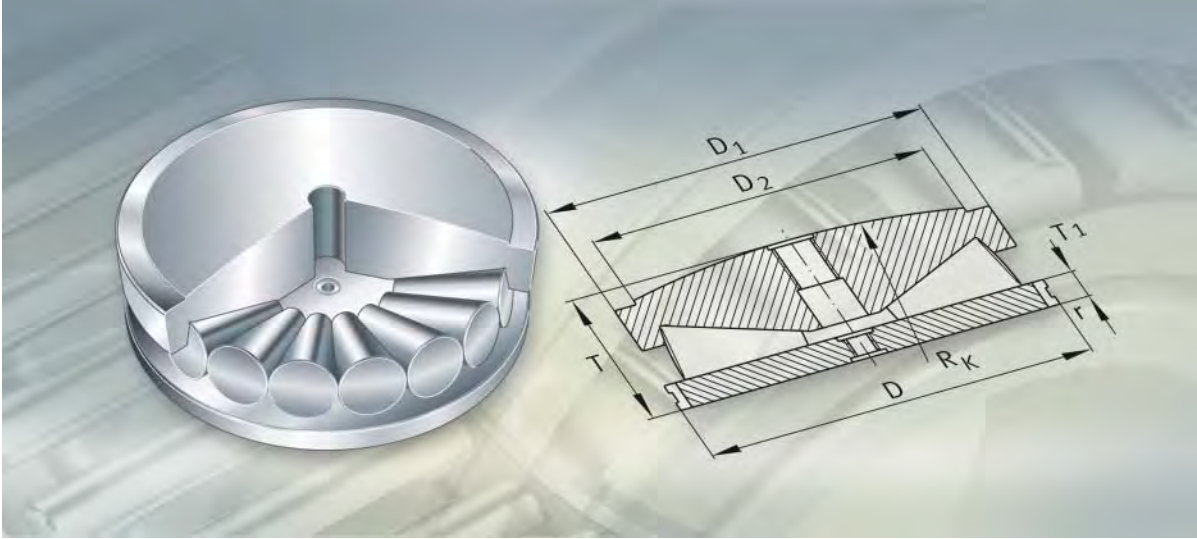
| Designation  | Design | Mass<br>m<br>≈kg | Dimensions |     |     |                |    |           |                        |
|--------------|--------|------------------|------------|-----|-----|----------------|----|-----------|------------------------|
|              |        |                  | d          | D   | T   | D <sub>1</sub> | B  | r<br>min. | r <sub>1</sub><br>min. |
| Z-529086.TA2 | 1      | 20,5             | <b>240</b> | 320 | 96  | 256            | 22 | 2         | 0,6                    |
| Z-545678.TA2 | 1      | 44               | <b>240</b> | 380 | 105 | 275            | 27 | 2         | 2                      |
| Z-532584.TA2 | 1      | 140              | <b>240</b> | 470 | 180 | 290            | 45 | 6         | 3                      |
| Z-547482.TA2 | 1      | 26               | <b>250</b> | 360 | 96  | 285            | 24 | 2,1       | 1,1                    |
| Z-522010.TA2 | 2      | 41               | <b>250</b> | 380 | 100 | 275            | 22 | 2         | 1,1                    |
| Z-509352.TA2 | 1      | 26               | <b>260</b> | 360 | 92  | 285            | 20 | 2,1       | 1,1                    |
| Z-527907.TA2 | 2      | 110              | <b>270</b> | 450 | 180 | 316            | 44 | 6         | 3                      |
| Z-524740.TA2 | 1      | 45               | <b>300</b> | 420 | 100 | 330            | 23 | 1,1       | 1,1                    |
| Z-544025.TA2 | 1      | 192              | <b>305</b> | 530 | 200 | 345            | 56 | 5         | 1,5                    |
| Z-528562.TA2 | 1      | 41,8             | <b>320</b> | 440 | 108 | 355            | 26 | 3         | 1,5                    |
| Z-509654.TA2 | 1      | 74,5             | <b>320</b> | 470 | 130 | 350            | 30 | 3         | 1,1                    |
| Z-540295.TA2 | 1      | 157              | <b>320</b> | 500 | 218 | 350            | 60 | 5         | 2                      |
| Z-522837.TA2 | 1      | 324              | <b>320</b> | 600 | 240 | 380            | 50 | 4         | 2                      |
| Z-530739.TA2 | 2      | 73               | <b>350</b> | 490 | 130 | 390            | 30 | 3         | 1,1                    |
| Z-579703.TA2 | 1      | 81               | <b>350</b> | 490 | 145 | 390            | 45 | 3         | 1,5                    |
| Z-522008.TA2 | 1      | 106              | <b>350</b> | 540 | 135 | 400            | 30 | 3         | 1                      |
| Z-573320.TA2 | 1      | 104              | <b>360</b> | 530 | 145 | 410            | 45 | 4         | 2                      |
| Z-524194.TA2 | 1      | 175              | <b>360</b> | 560 | 200 | 396            | 48 | 5         | 2                      |
| Z-513828.TA2 | 1      | 90               | <b>380</b> | 530 | 130 | 410            | 30 | 5         | 3                      |
| Z-513125.TA2 | 1      | 102              | <b>380</b> | 560 | 130 | 430            | 32 | 2,5       | 1,5                    |
| Z-548285.TA2 | 1      | 110              | <b>380</b> | 560 | 138 | 430            | 40 | 2,5       | 1,5                    |
| Z-567356.TA2 | 1      | 129              | <b>380</b> | 560 | 145 | 430            | 47 | 2,5       | 1,5                    |
| Z-545936.TA2 | 2      | 275              | <b>380</b> | 650 | 215 | 450            | 65 | 6         | 3                      |
| Z-540162.TA2 | 1      | 235              | <b>400</b> | 650 | 200 | 450            | 50 | 5         | 2                      |
| Z-524134.TA2 | 1      | 108              | <b>410</b> | 560 | 160 | 440            | 40 | 5         | 2                      |
| Z-509392.TA2 | 1      | 185              | <b>420</b> | 620 | 170 | 470            | 35 | 3         | 1,5                    |
| Z-545991.TA2 | 1      | 202              | <b>420</b> | 620 | 185 | 470            | 50 | 3         | 1                      |
| Z-579704.TA2 | 1      | 217              | <b>420</b> | 620 | 200 | 470            | 65 | 3         | 3                      |
| Z-534038.TA2 | 2      | 170              | <b>440</b> | 645 | 167 | 500            | 50 | 5         | 2                      |
| Z-513401.TA2 | 2      | 150              | <b>450</b> | 645 | 155 | 500            | 38 | 5         | 3                      |
| Z-509391.TA2 | 2      | 283              | <b>470</b> | 720 | 200 | 535            | 50 | 3         | 2                      |
| Z-549701.TA2 | 1      | 296              | <b>470</b> | 720 | 210 | 535            | 60 | 3         | 2                      |
| Z-547584.TA2 | 2      | 280              | <b>480</b> | 710 | 218 | 575            | 57 | 5         | 3                      |
| Z-511746.TA2 | 2      | 235              | <b>530</b> | 710 | 218 | 575            | 57 | 5         | 2                      |
| Z-515196.TA2 | 2      | 296              | <b>550</b> | 760 | 230 | 610            | 50 | 5         | 2                      |
| Z-521823.TA2 | 2      | 395              | <b>670</b> | 900 | 230 | 725            | 50 | 5         | 2                      |



Mounting dimensions



| Mounting dimensions |       |          | Basic load ratings |                   | Fatigue limit load |
|---------------------|-------|----------|--------------------|-------------------|--------------------|
| $d_a$               | $r_a$ | $r_{a1}$ | dyn.<br>$C_a$      | stat.<br>$C_{0a}$ | $C_{ua}$           |
| max.                | max.  | max.     | kN                 | kN                | kN                 |
| 249                 | 2     | 0,6      | 640                | 2 750             | 217                |
| 267                 | 2     | 2        | 1 000              | 5 300             | 435                |
| 278                 | 5     | 2,5      | 2 550              | 12 100            | 910                |
| 274                 | 2     | 1        | 710                | 3 250             | 255                |
| 267                 | 2     | 1        | 1 000              | 5 300             | 435                |
| 274                 | 2     | 1        | 710                | 3 250             | 255                |
| 302                 | 5     | 2,5      | 2 100              | 8 900             | 650                |
| 322                 | 1     | 1        | 890                | 4 550             | 350                |
| –                   | 4     | 1,5      | 3 000              | 14 700            | 1 080              |
| 345                 | 2,5   | 1,5      | 1 020              | 5 200             | 390                |
| 335                 | 2,5   | 1        | 1 400              | 6 900             | 510                |
| –                   | 4     | 2        | 2 400              | 10 100            | 730                |
| 360                 | 3     | 2        | 4 000              | 18 300            | 1 280              |
| 375                 | 2,5   | 1        | 1 370              | 7 100             | 510                |
| 375                 | 2,5   | 1,5      | 1 370              | 7 100             | 510                |
| 385                 | 2,5   | 1        | 1 860              | 10 800            | 790                |
| 398                 | 3     | 2        | 1 570              | 8 300             | 590                |
| 383                 | 4     | 2        | 3 050              | 13 800            | 970                |
| 398                 | 4     | 2,5      | 1 540              | 8 000             | 580                |
| 411                 | 2,5   | 1,5      | 1 860              | 11 100            | 800                |
| 411                 | 2,5   | 1,5      | 1 860              | 11 100            | 800                |
| 411                 | 2,5   | 1,5      | 1 860              | 11 100            | 800                |
| 430                 | 5     | 2,5      | 3 850              | 20 000            | 1 390              |
| –                   | 4     | 2        | 3 850              | 20 000            | 1 390              |
| 426                 | 4     | 2        | 1 840              | 9 400             | 650                |
| 450                 | 2,5   | 1,5      | 2 350              | 12 500            | 870                |
| 450                 | 2,5   | 1        | 2 350              | 12 500            | 870                |
| 450                 | 2,5   | 2,5      | 2 350              | 12 500            | 870                |
| 480                 | 4     | 2        | 2 300              | 13 100            | 900                |
| 480                 | 4     | 2,5      | 2 300              | 13 100            | 900                |
| 517                 | 2,5   | 2        | 3 500              | 19 900            | 1 330              |
| 517                 | 2,5   | 2        | 3 500              | 19 900            | 1 330              |
| 555                 | 4     | 2,5      | 2 800              | 14 800            | 960                |
| 555                 | 4     | 2        | 2 800              | 14 800            | 960                |
| 581                 | 4     | 2        | 3 350              | 17 300            | 1 100              |
| 700                 | 4     | 2        | 4 000              | 22 400            | 1 380              |



**Axial tapered roller bearings  
for screw-down mechanisms**

# Axial tapered roller bearings for screw-down mechanisms

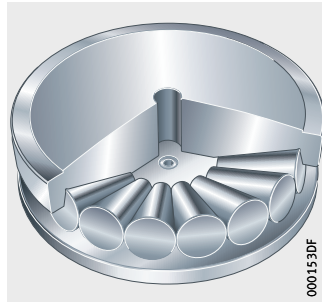
|                                     | Page  |
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| <b>Product overview</b>             | Axial tapered roller bearings for screw-down mechanisms ..... 814 |
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# Product overview Axial tapered roller bearings for screw-down mechanisms

Single direction

Z-5..TA1-02, F-8..TA1-02





# Axial tapered roller bearings for screw-down mechanisms

**Features** These single direction axial tapered roller bearings are special bearings for screw-down mechanisms on rolling stands. The tapered rollers are guided by the rib of the shaft locating washer and run on a plain washer arranged below this. Due to their low friction, these bearings reduce the screw-down forces of the mechanisms. Axial tapered roller bearings have non-standardised metric or inch size main dimensions and designations Z-5..TA1 or F-8..TA1. The bearings are separable. The bearing washers and rollers can be mounted separately.

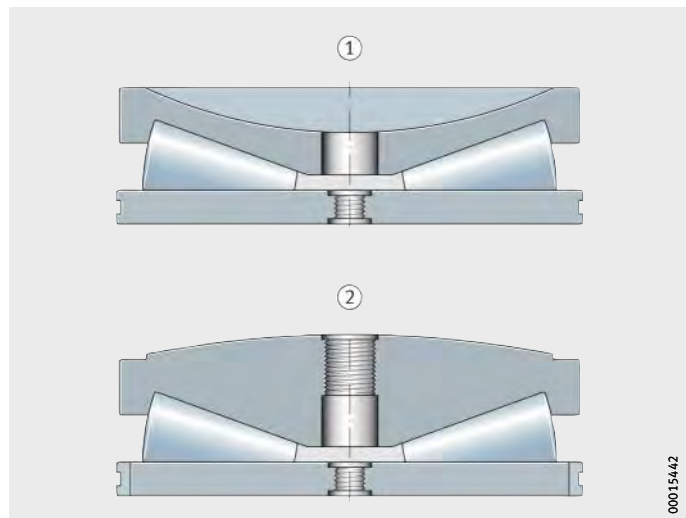
**Axial load capacity** In order that the bearings have an extremely high axial load carrying capacity in one direction, they are generally of a full complement design. Some bearing sizes are also available with a cage.

**Compensation of angular misalignments** Axial tapered roller bearings for screw-down mechanisms are designed such that they can support the adjustment movements of chocks. The various bearing designs are matched to the specific application. Some bearings have a concave or convex shaft locating washer, *Figure 1*. The adjustment movement can also be facilitated by concave or convex thrust washers, *Figure 2*, page 816.

- Design 1 ■ The bearings have a shaft locating washer with a concave upper surface, *Figure 1* ①. The screw-down mechanism is of a spherical design.
- Design 2 ■ In these bearings, the shaft locating washer has a convex upper surface, *Figure 1* ②. The screw-down mechanism is of a concave design.

- ① Design 1
- ② Design 2

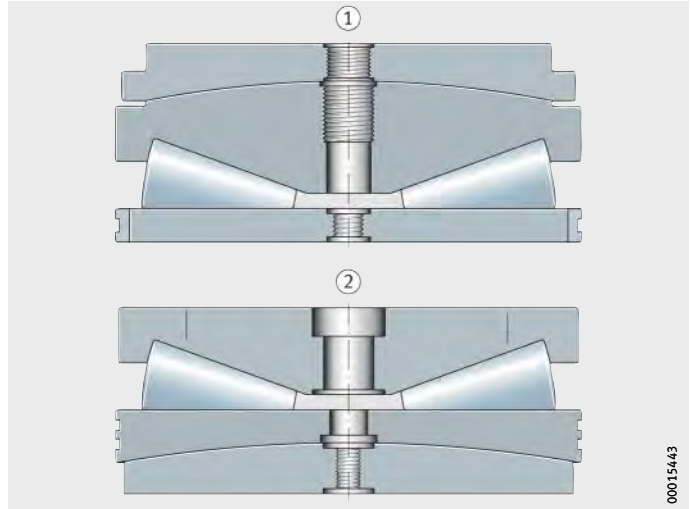
*Figure 1*  
Axial tapered roller bearings for screw-down mechanisms



00015442

## Axial tapered roller bearings for screw-down mechanisms

- Design 3 ■ In these bearings, the adjustment movements are supported between a shaft locating washer with a convex upper surface and a concave thrust washer, *Figure 2* ①.
- Design 4 ■ Bearings of this design support the adjustment movements between a plain washer with a concave lower surface and a convex thrust washer, *Figure 2* ②.



- ① Design 3  
② Design 4

*Figure 2*  
Axial tapered roller bearings  
for screw-down mechanisms  
(continued)

### Operating temperature

Axial tapered roller bearings for screw-down mechanisms can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .

**Design and  
safety guidelines**  
**Equivalent  
static bearing load**

Axial tapered roller bearings for screw-down mechanisms can only support static axial forces in one direction.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

$P_0$                                   kN  
Equivalent static bearing load  
 $F_{0a}$                                 kN  
Axial static bearing load.



**Requisite  
static load safety factor**

The security against excessive plastic deformations at the contact points of the rolling elements is indicated by the static load safety factor  $S_0$ .

In the case of bearings for screw-down mechanisms, the aim should be to achieve a value of  $S_0 = 1,8$  to  $2$ .

$$S_0 = \frac{C_{0a}}{P_0}$$

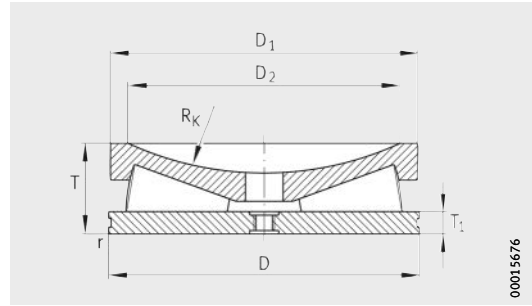
$S_0$                                         –  
Static load safety factor  
 $C_{0a}$                                     kN  
Basic static load rating, see dimension tables  
 $P_0$                                         kN  
Equivalent static bearing load.

**Accuracy**

The dimensional and running tolerances of non-standardised axial tapered roller bearings are matched to the specific application and should be requested from Schaeffler Technologies.

# Axial tapered roller bearings

For screw-down mechanisms

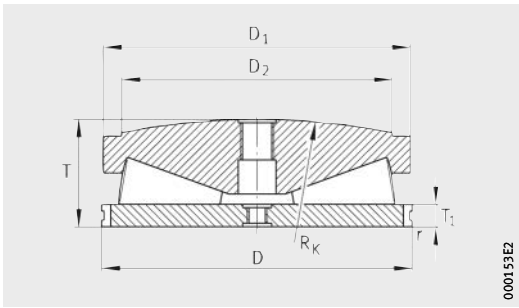


Design 1  
Design 3, page 820  
Design 4, page 821

**Dimension table** - Dimensions in mm

| Designation     | Design          | Mass<br>m<br>≈kg | Dimensions     |                |                |                |                |
|-----------------|-----------------|------------------|----------------|----------------|----------------|----------------|----------------|
|                 |                 |                  | D              | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> |
| Z-525469.TA1    | 2               | 62               | <b>320,68</b>  | 318,31         | 279,4          | –              | –              |
| Z-567355.TA1    | 3 <sup>1)</sup> | 75               | <b>320,68</b>  | 318,31         | –              | 275            | 318,31         |
| Z-534470.TA1    | 2               | 100              | <b>377,825</b> | 375,46         | 330,2          | –              | –              |
| Z-573271.TA1    | 3 <sup>1)</sup> | 125              | <b>377,825</b> | 375,46         | –              | 300            | 370            |
| Z-542974.TA1    | 1               | 127              | <b>409,575</b> | 407,16         | 330,2          | –              | –              |
| Z-533632.TA1    | 2               | 110              | <b>409,58</b>  | 409,58         | 355,6          | –              | –              |
| Z-524192.TA1    | 2 <sup>1)</sup> | 128              | <b>409,58</b>  | 407,21         | 355,6          | –              | –              |
| Z-580635.TA1    | 3               | 157              | <b>409,58</b>  | 407,21         | –              | 355            | 355            |
| Z-565300.TA1    | 1               | 156              | <b>438,15</b>  | 435,79         | 381            | –              | –              |
| Z-517113.TA1    | 2 <sup>1)</sup> | 157              | <b>438,15</b>  | 435,79         | 381            | –              | –              |
| Z-548480.TA1    | 1               | 184              | <b>457,2</b>   | 448,34         | 336,6          | –              | –              |
| Z-528348.TA1    | 2               | 185              | <b>482,6</b>   | 482,6          | 444,5          | –              | –              |
| Z-580692.TA1    | 3               | 260              | <b>482,6</b>   | 482,6          | –              | 425            | 508            |
| Z-517982.TA1    | 2               | 228              | <b>495,3</b>   | 492,94         | 431,8          | –              | –              |
| Z-522978.TA1    | 2               | 228              | <b>495,3</b>   | 492,94         | 431,8          | –              | –              |
| Z-573917.TA1    | 2               | 228              | <b>495,3</b>   | 492,94         | 431,8          | –              | –              |
| Z-525914.TA1    | 4               | 274              | <b>495,3</b>   | 495,3          | –              | –              | 476            |
| Z-536435.TA1    | 2               | 278              | <b>514,35</b>  | 521,25         | 403,1          | –              | –              |
| Z-517979.TA1    | 2 <sup>1)</sup> | 258              | <b>523,875</b> | 521,51         | 457,2          | –              | –              |
| Z-527580.TA1    | 2               | 243              | <b>523,875</b> | 521,51         | 457,2          | –              | –              |
| Z-531555.TA1    | 2 <sup>1)</sup> | 274              | <b>533,4</b>   | 533,4          | 457,2          | –              | –              |
| Z-548693.TA1    | 1               | 255              | <b>533,4</b>   | 533,4          | 460,3          | –              | –              |
| Z-512525.01.TA1 | 2 <sup>1)</sup> | 274              | <b>533,4</b>   | 533,4          | 495            | –              | –              |
| Z-547666.TA1    | 1               | 287              | <b>533,4</b>   | 533,4          | 460            | –              | –              |
| Z-566306.TA1    | 3 <sup>1)</sup> | 373              | <b>533,4</b>   | 533,4          | –              | 416            | 530            |
| F-800901.TA1    | 3               | 352              | <b>533,4</b>   | 533,4          | –              | 410            | 500            |
| Z-534972.TA1    | 2 <sup>1)</sup> | 292              | <b>533,45</b>  | 533,4          | 495            | –              | –              |
| Z-527805.TA1    | 1               | 260              | <b>551,69</b>  | 539,75         | 406,4          | –              | –              |
| Z-542654.TA1    | 1               | 318              | <b>555</b>     | 555            | 414            | –              | –              |
| Z-527795.TA1    | 1               | 274              | <b>555,63</b>  | 553,26         | 482,6          | –              | –              |
| Z-524340.TA1    | 2 <sup>1)</sup> | 318              | <b>555,63</b>  | 553,26         | 482,5          | –              | –              |
| Z-542752.TA1    | 2               | 340              | <b>578,66</b>  | 578,66         | 495            | –              | –              |

<sup>1)</sup> Without retaining slot in the plain washer.



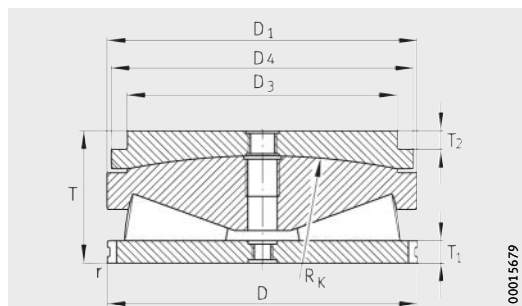
Design 2



| T       | T <sub>1</sub> | T <sub>2</sub> | R <sub>k</sub> | r<br>min. | Basic load rating              |
|---------|----------------|----------------|----------------|-----------|--------------------------------|
|         |                |                |                |           | stat.<br>C <sub>0a</sub><br>kN |
| 110,97  | 22,23          | –              | 762            | 1,6       | 12 500                         |
| 135     | 22,23          | 6              | 762            | 1,6       | 12 800                         |
| 129,01  | 25,4           | –              | 914,4          | 1,6       | 17 500                         |
| 164,01  | 25,4           | 10             | 914,4          | 1,6       | 17 000                         |
| 139,7   | 28,575         | –              | 508            | –         | 20 700                         |
| 122,2   | –              | –              | 508            | –         | 20 700                         |
| 140,77  | 28,58          | –              | 1 016          | 6         | 20 700                         |
| 188     | 28,58          | –              | 1 016          | 2,3       | 20 400                         |
| 149,23  | 50,4           | –              | 1 270          | 3,2       | 24 100                         |
| 150,673 | 31,75          | –              | 1 016          | 3,2       | 23 600                         |
| 161,925 | 31,075         | –              | 508            | 3         | 26 500                         |
| 145,54  | 38,1           | –              | 1 905          | 1,6       | 27 000                         |
| 205,54  | 38,1           | 44             | 1 905          | 1,6       | 27 000                         |
| 170,61  | 34,93          | –              | 1 066,8        | 3,2       | 31 000                         |
| 170,61  | 34,93          | –              | 1 066,8        | 3,2       | 31 000                         |
| 170,61  | 34,93          | –              | 1 066,8        | 3,2       | 31 000                         |
| 210     | 100            | –              | 885            | –         | 30 500                         |
| 189,1   | 34,92          | –              | 635            | –         | 36 500                         |
| 175,768 | 34,925         | –              | 1 270          | 3,2       | 36 000                         |
| 175,768 | 34,925         | –              | 1 610,7        | 3,2       | 36 500                         |
| 177,8   | 31,75          | –              | 1 981,2        | 3,2       | 36 500                         |
| 177,8   | 31,75          | –              | 1 270          | 3         | 36 500                         |
| 177,8   | 31,75          | –              | 1 981,2        | 1,6       | 39 500                         |
| 190,5   | 50,8           | –              | –              | –         | 36 500                         |
| 237,8   | 31,75          | 8,8            | 1 981,2        | 3,2       | 39 500                         |
| 245     | 31,75          | 45             | 1 981,2        | 3,2       | 39 500                         |
| 190,5   | 31,75          | –              | 1 219,2        | 3,2       | 36 500                         |
| 158,75  | 25,4           | –              | 635            | 3,2       | 36 000                         |
| 190,5   | 50             | –              | 1 270          | –         | 39 000                         |
| 165,1   | 38,1           | –              | 635            | 3,2       | 38 000                         |
| 190,86  | 38,1           | –              | 1 270          | 3,2       | 38 000                         |
| 187,81  | 38,1           | –              | 1 981,2        | –         | 43 500                         |

# Axial tapered roller bearings

For screw-down mechanisms



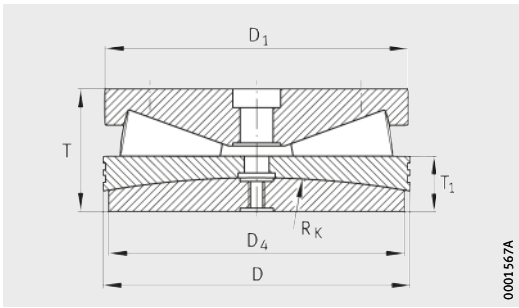
Design 3  
Design 2, page 819

**Dimension table** (continued) · Dimensions in mm

| Designation     | Design          | Mass<br>m<br>≈kg | Dimensions    |                |                |                |                |
|-----------------|-----------------|------------------|---------------|----------------|----------------|----------------|----------------|
|                 |                 |                  | D             | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> |
| Z-547440.TA1    | 2 <sup>1)</sup> | 355              | <b>581,02</b> | 578,66         | 508            | –              | –              |
| Z-531065.TA1    | 2 <sup>1)</sup> | 355              | <b>581,03</b> | 578,66         | 508            | –              | –              |
| Z-525652.TA1    | 4 <sup>2)</sup> | 435              | <b>581,03</b> | 581,03         | –              | –              | 571,5          |
| Z-525652.TA1-V  | 4               | 435              | <b>581,03</b> | 581,03         | –              | –              | 571,5          |
| F-800903.TA1    | 3               | 450              | <b>581,03</b> | 578,66         | –              | 500            | 570            |
| Z-565906.TA1    | 3 <sup>1)</sup> | 450              | <b>581,03</b> | 578,66         | –              | 460            | 570            |
| Z-526199.TA1    | 2               | 413              | <b>609,6</b>  | 607,24         | 533,4          | –              | –              |
| Z-533179.01.TA1 | 4               | 415              | <b>609,6</b>  | 609,6          | –              | –              | 582,63         |
| Z-563648.TA1    | 3               | 512              | <b>609,6</b>  | 607,24         | 533,4          | 585            | 710            |
| Z-526198.TA1    | 2 <sup>1)</sup> | 419              | <b>641,35</b> | 638,99         | 558,8          | –              | –              |
| Z-578367.01.TA1 | 3               | 565              | <b>641,35</b> | 638,99         | –              | 560            | 635            |
| Z-547969.TA1    | 4               | 700              | <b>641,35</b> | 655            | –              | –              | 634            |
| F-801496.TA1    | 2               | 900              | <b>768,35</b> | 765,81         | 609,6          | –              | –              |
| Z-527184.TA1    | 4 <sup>2)</sup> | 1 100            | <b>800</b>    | 800            | –              | –              | 740            |
| Z-527184.TA1-V  | 4               | 1 100            | <b>800</b>    | 800            | –              | –              | 740            |
| Z-523387.TA1    | 4 <sup>2)</sup> | 1 320            | <b>850</b>    | 850            | –              | –              | 775            |
| Z-544992.TA1    | 4 <sup>2)</sup> | 1 650            | <b>900</b>    | 900            | –              | –              | 830            |
| Z-544992.TA1-V  | 4               | 1 650            | <b>900</b>    | 900            | –              | –              | 830            |
| Z-543242.TA1    | 3 <sup>2)</sup> | 1 740            | <b>920</b>    | 920            | –              | 768            | 915            |
| Z-543242.TA1-V  | 3               | 1 670            | <b>920</b>    | 920            | –              | 768            | 915            |
| Z-530866.TA1    | 4               | 2 100            | <b>1 016</b>  | 1 016          | –              | –              | –              |
| Z-565979.TA1    | 4               | 2 490            | <b>1 095</b>  | 1 100          | –              | –              | 1 050          |

1) Without retaining slot in the plain washer.

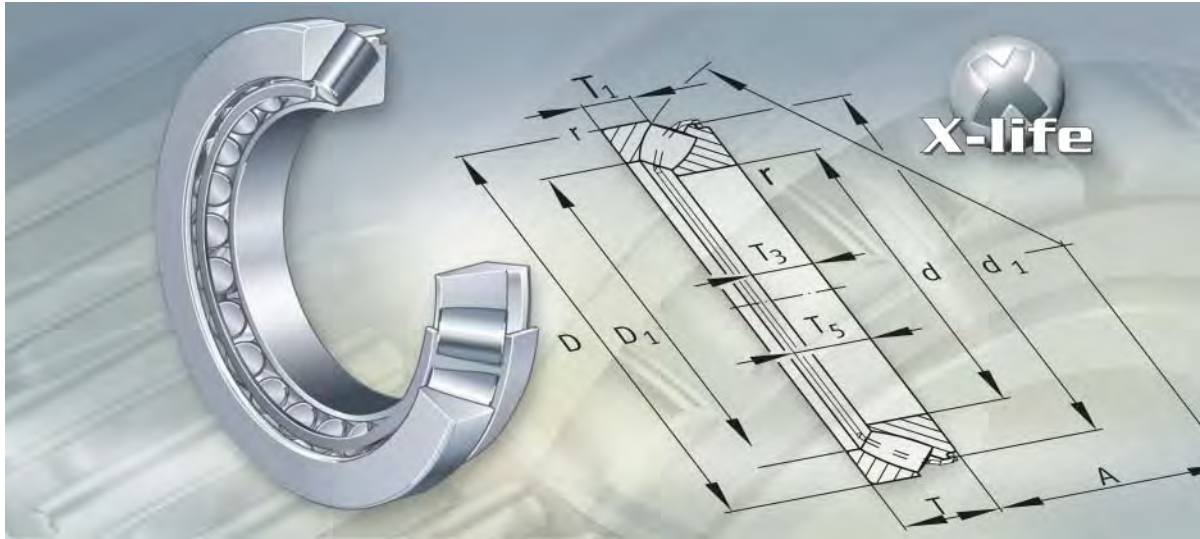
2) Axial tapered roller bearings for screw-down mechanisms with solid brass cage; all other bearings are of a full complement roller design.



Design 4



| T       | T <sub>1</sub> | T <sub>2</sub> | R <sub>k</sub> | r<br>min. | Basic load rating              |
|---------|----------------|----------------|----------------|-----------|--------------------------------|
|         |                |                |                |           | stat.<br>C <sub>0a</sub><br>kN |
| 196,65  | 38,1           | –              | 1 308,1        | 3,2       | 43 500                         |
| 193,78  | 38,1           | –              | 1 422,4        | 3,2       | 42 500                         |
| 240,77  | 108            | –              | 1 270          | –         | 31 500                         |
| 240,77  | 108            | –              | 1 270          | –         | 43 500                         |
| 243,78  | 38,1           | 39             | 1 422,4        | 3,2       | 43 500                         |
| 243,78  | 38,1           | 5              | 1 422,4        | 3,2       | 43 500                         |
| 204,01  | 38,1           | –              | 1 524          | 3,2       | 49 000                         |
| 249,96  | 108            | –              | 1 270          | –         | 49 000                         |
| 254,01  | 38,1           | 40             | 1 524          | 3,2       | 48 000                         |
| 212,67  | 38,1           | –              | 1 524          | 3,2       | 49 000                         |
| 260     | 38,1           | 45             | 1 524          | 3,2       | 54 000                         |
| 282     | 136,3          | –              | 1 270          | –         | 42 500                         |
| 295,275 | 70             | –              | 1 524          | 3,2       | 68 000                         |
| 320     | 175            | –              | 1 500          | –         | 53 000                         |
| 320     | 175            | –              | 1 500          | –         | 64 000                         |
| 360     | 195            | –              | 1 500          | –         | 60 000                         |
| 390     | 130            | –              | 1 500          | –         | 79 000                         |
| 390     | 130            | –              | 1 500          | –         | 93 000                         |
| 370     | 70             | 20             | 2 300          | 7,5       | 65 500                         |
| 370     | 70             | 20             | 2 300          | 7,5       | 80 000                         |
| 412,75  | 111,15         | –              | 1 900          | –         | 83 000                         |
| 380     | 175            | –              | 3 000          | –         | 131 000                        |



**Axial spherical roller bearings**



# Axial spherical roller bearings

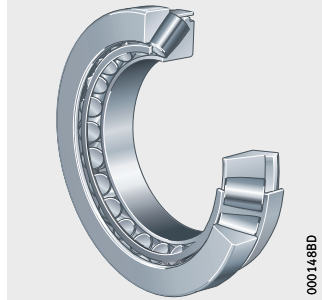
|                                     |   | Page |
|-------------------------------------|---|------|
| <b>Product overview</b>             | Axial spherical roller bearings .....       | 824  |
| <b>Features</b>                     | <b>X-life</b> .....                         | 825  |
|                                     | Axial and radial load capacity .....        | 825  |
|                                     | Compensation of angular misalignments ..... | 825  |
|                                     | Sealing.....                                | 826  |
|                                     | Lubrication .....                           | 826  |
|                                     | Operating temperature .....                 | 826  |
|                                     | Cages.....                                  | 826  |
|                                     | Suffixes.....                               | 826  |
| <b>Design and safety guidelines</b> | Equivalent dynamic bearing load .....       | 827  |
|                                     | Equivalent static bearing load.....         | 827  |
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| <b>Dimension tables</b>             | Axial spherical roller bearings.....        | 830  |



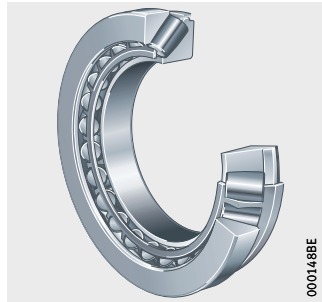
# Product overview Axial spherical roller bearings

## Increased capacity design With sheet metal cage

293..-E1, 294..-E1

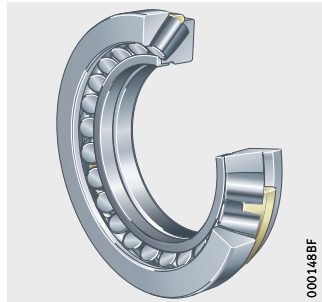


293..-E, 294..-E



## With solid cage

292..-E, 293..-E, 294..-E



# Axial spherical roller bearings

**Features** Axial spherical roller bearings are single row, self-aligning roller bearings. They comprise solid shaft and housing locating washers and asymmetrical barrel rollers with cages. The cage holds the roller and cage assembly and the shaft locating washer together. The bearings are separable. As a result, the bearing components can be mounted separately.

**X-life** Some axial spherical roller bearings of the series 293..-E1 and 294..-E1 are of X-life quality. These bearings are indicated in the dimension tables.

The bearings have an internal construction that gives increased basic load ratings as well as a precise contact geometry between the guidance rib and the end of the roller for improved kinematics. Friction and wear are reduced as a result of optimum lubricant film formation and a new cage design with improved guidance of the rollers and lubricant. Optimised osculation conditions give more uniform distribution of pressure between the rollers and raceways.

Due to the increased axial load carrying capacity and reduced bearing temperature, the rating life is significantly improved under the same operating conditions.



## Axial and radial load capacity

Axial spherical roller bearings can support very high axial loads and allow relatively high speeds. Since the raceways are inclined relative to the bearing axis, the bearings can also support radial loads, see section Radial load, page 827.

## Compensation of angular misalignments

Axial spherical roller bearings can be swivelled about their central position by a few degrees, see table.

As a result, they permit skewing between the housing and shaft locating washer and can thus compensate misalignments, shaft deflections and housing deformations.

The adjustment angles given in the table are permissible under the following conditions:

- $P$  or  $P_0 \leq 0,05 \cdot C_{0a}$
- the angular deviation is constant (static angular misalignment)
- the rotating component is the shaft locating washer.

## Permissible skewing

| Series       | Permissible skewing <sup>1)</sup> |
|--------------|-----------------------------------|
| 292..-E(-E1) | 1°                                |
| 293..-E(-E1) | 1,5°                              |
| 294..-E(-E1) | 2°                                |

<sup>1)</sup> If the rotating component is the housing locating washer or the shaft locating washer undergoes tumbling motion, the angular adjustment facility is smaller.

# Axial spherical roller bearings

**Sealing** Axial spherical roller bearings are not sealed.

**Lubrication** The bearings are not greased. They are generally lubricated using oil. In some cases, lubrication with greases containing EP additives is also possible. Adequate supply to the contact points between the rollers and guidance rib is best achieved if the bearings are completely filled with grease.

**Operating temperature** Axial spherical roller bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+200\text{ }^{\circ}\text{C}$ .

**Cages** The standard cages for axial spherical roller bearings are shown in the table.  
Bearings with the suffix MB have a solid brass cage that is guided on the shaft locating washer.  
The other bearings have sheet steel cages and do not have a cage suffix.

**Cage and bore code**

| Series       | Sheet steel cage<br>Bore code | Solid brass cage |
|--------------|-------------------------------|------------------|
| 292..-E(-E1) | –                             | All              |
| 293..-E1     | All                           | –                |
| 294..-E1     | All                           | –                |
| 293..-E      | up to 64                      | from 68          |
| 294..-E      | up to 68                      | from 72          |

**Suffixes** Suffixes for available designs: see table.

**Available designs**

| Suffix | Description               | Design   |
|--------|---------------------------|----------|
| E, E1  | Increased capacity design | Standard |
| MB     | Solid brass cage          |          |

**Design and safety guidelines**  
**Equivalent dynamic bearing load**

For bearings under dynamic loading, the following applies:

$$P = F_a + 1,2 \cdot F_r$$

P kN  
 Equivalent dynamic bearing load for combined load  
 F<sub>a</sub> kN  
 Axial dynamic bearing load  
 F<sub>r</sub> kN  
 Radial dynamic bearing load.

**Radial load**



The radial bearing load must not exceed 55% of the axial load:  
 $F_r \leq 0,55 \cdot F_a$ .

**Equivalent static bearing load**

For bearings under static loading, the following applies:

$$P_0 = F_{0a} + 2,7 \cdot F_{0r}$$

P<sub>0</sub> kN  
 Equivalent static bearing load for combined load  
 F<sub>0a</sub> kN  
 Axial static bearing load  
 F<sub>0r</sub> kN  
 Radial static bearing load.

**Radial load**



The radial bearing load must not exceed 55% of the axial load:  
 $F_{0r} \leq 0,55 \cdot F_{0a}$ .

**Static load safety factor**

For the static load safety factor S<sub>0</sub>, the following values must be observed:

**Static load safety factor**

| Static load safety factor S <sub>0</sub> | Preconditions   |
|--|---|
| S <sub>0</sub> ≥ 8                       | Axial support by the abutment shoulders in accordance with the bearing tables (d <sub>a</sub> and D <sub>a</sub> )  |
| S <sub>0</sub> ≥ 6                       | Full axial support of the housing and shaft locating washers on the entire abutment surface, dimensions D <sub>1</sub> and d <sub>1</sub> , see dimension table                 |
| S <sub>0</sub> ≥ 4                       | Full axial support, dimensions D <sub>1</sub> and d <sub>1</sub> , see dimension table, together with good radial support of the housing locating washer (housing tolerance K7) |



# Axial spherical roller bearings

## Minimum axial load

A minimum axial load  $F_{a \min}$  according to the equation must be applied:

$$F_{a \min} = 0,0005 \cdot C_{0a} + k_a \left( \frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a \min}$  N  
 Minimum axial load  
 $C_{0a}$  N  
 Basic static load rating, see dimension table (observe dimension)  
 $k_a$  –  
 Factor for determining the minimum load, see table  
 $n$   $\text{min}^{-1}$   
 Maximum speed.

## Factor $k_a$

| Series       | Factor $k_a$ |
|--------------|--------------|
| 292..-E(-E1) | 0,6          |
| 293..-E(-E1) | 0,9          |
| 294..-E(-E1) | 0,7          |

## Speeds



The limiting speeds  $n_G$  given in the dimension tables must not be exceeded. The values are for oil lubrication.

The reference speeds  $n_B$  were calculated in accordance with ISO 15 312.

## Design of bearing arrangements

The tolerances for the shaft and locating bore must be selected in accordance with the table.

### Shaft and housing tolerances

| Adjacent part | Type of load  | Operating conditions  | Tolerance |
|---------------|---------------|---|-----------|
| Shaft         | Combined load | Point load for shaft locating washer  | j6        |
|               |               | Circumferential load for shaft locating washer, shaft diameter up to 200 mm | j6 (k6)   |
|               |               | Circumferential load for shaft locating washer, shaft diameter over 200 mm  | k6 (m6)   |
| Housing       | Axial load    | Normal loads  | E8        |
|               |               | High loads  | G7        |
|               | Combined load | Point load for housing locating washer                                      | H7        |
|               |               | Circumferential load for housing locating washer                            | K7        |

### Adjacent parts

The axial runout tolerances of the abutment shoulders should be to IT5 or better. The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

Above the housing locating washer, a recess of diameter  $D_{b \min}$  must be provided in the housing bore, see dimension table. Otherwise, the rollers will foul the housing when the shaft swivels.



In the new internal construction of the E1 design, attention must be paid to the mounting dimensions. This also applies to the design of the spacer sleeve on the shaft locating washer (dimensions  $d_b$ ,  $d_{b1}$ ).

### Accuracy

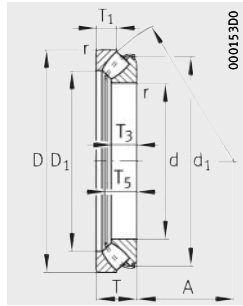
The main dimensions of the bearings conform to ISO 104 and DIN 728.

The dimensional and running tolerances correspond to tolerance class PN to DIN 620-3.

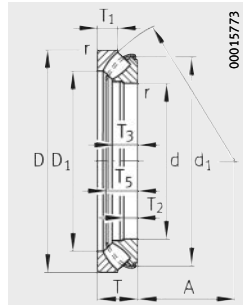
The section height tolerance for axial spherical roller bearings of the E1 design is restricted by up to 70% compared to the standard.



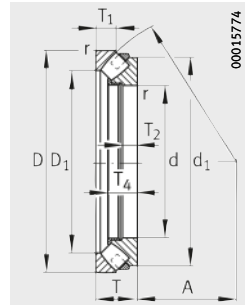
# Axial spherical roller bearings



293...-E1, 294...-E1



293...-E, 294...-E

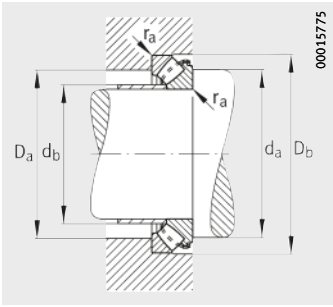


292...-E(E1)-MB,  
293...-E-MB, 294...-E-MB

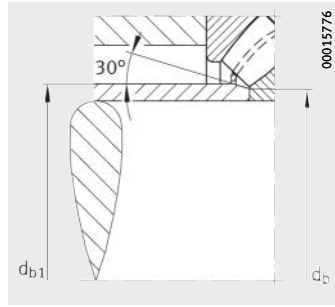
**Dimension table** - Dimensions in mm

| Designation | X-life | Mass<br>m<br>≈ kg | Dimensions |     |     |                |                |     |                |                |                |                |                |     |
|-------------|--------|-------------------|------------|-----|-----|----------------|----------------|-----|----------------|----------------|----------------|----------------|----------------|-----|
|             |        |                   | d          | D   | T   | D <sub>1</sub> | d <sub>1</sub> | r   | T <sub>1</sub> | T <sub>2</sub> | T <sub>3</sub> | T <sub>4</sub> | T <sub>5</sub> | A   |
| 29432-E1    | XL     | 32,1              | 160        | 320 | 95  | 223,5          | 283,5          | 5   | 45,5           | –              | 60,5           | –              | 84,3           | 99  |
| 29434-E1    | XL     | 39,6              | 170        | 340 | 103 | 236            | 305            | 5   | 50             | –              | 65,5           | –              | 91,2           | 104 |
| 29436-E1    | XL     | 47,6              | 180        | 360 | 109 | 250            | 315,5          | 5   | 53             | –              | 69,5           | –              | 96,4           | 110 |
| 29338-E1    | XL     | 22,3              | 190        | 320 | 78  | 243,5          | 290,1          | 4   | 36             | –              | 49             | –              | 71,3           | 110 |
| 29438-E     | –      | 54,9              | 190        | 380 | 115 | 268            | 340            | 5   | 55             | 41             | 73             | –              | 94             | 117 |
| 29340-E1    | XL     | 27,3              | 200        | 340 | 85  | 257            | 308,8          | 4   | 40             | –              | 53,5           | –              | 76,7           | 116 |
| 29440-E     | –      | 64,7              | 200        | 400 | 122 | 282            | 360            | 5   | 59             | 44             | 77             | –              | 99             | 122 |
| 29344-E     | –      | 29,9              | 220        | 360 | 85  | 279            | 330            | 4   | 41             | 31             | 53             | –              | 71             | 125 |
| 29444-E     | –      | 67,4              | 220        | 420 | 122 | 303            | 375            | 6   | 58             | 44             | 76,5           | –              | 99             | 132 |
| 29248-E1-MB | –      | 16,6              | 240        | 340 | 60  | 283            | 320            | 2,1 | 30             | 22             | 37             | 57             | –              | 130 |
| 29348-E     | –      | 32,5              | 240        | 380 | 85  | 299            | 350            | 4   | 41             | 31             | 53             | –              | 71             | 135 |
| 29448-E     | –      | 73,5              | 240        | 440 | 122 | 321            | 400            | 6   | 59             | 44             | 78             | –              | 99             | 142 |
| 29252-E-MB  | –      | 17                | 260        | 360 | 60  | 302            | 340            | 2,1 | 30             | 22             | 38             | 44             | –              | 139 |
| 29352-E     | –      | 45,2              | 260        | 420 | 95  | 327            | 385            | 5   | 45             | 34             | 61             | –              | 79             | 148 |
| 29452-E     | –      | 93,6              | 260        | 480 | 132 | 353            | 435            | 6   | 64             | 48             | 83             | –              | 107            | 154 |
| 29256-E-MB  | –      | 19,2              | 280        | 380 | 60  | 322            | 360            | 2,1 | 30             | 22             | 38             | 44             | –              | 150 |
| 29356-E     | –      | 48,8              | 280        | 440 | 95  | 346            | 405            | 5   | 46             | 34             | 61             | –              | 79             | 158 |
| 29456-E     | –      | 121               | 280        | 520 | 145 | 380            | 470            | 6   | 68             | 52             | 92             | –              | 118            | 166 |
| 29260-E-MB  | –      | 28,6              | 300        | 420 | 73  | 353            | 395            | 3   | 38             | 26             | 44             | 51             | –              | 162 |
| 29360-E     | –      | 66,4              | 300        | 480 | 109 | 378            | 440            | 5   | 50             | 39             | 69             | –              | 90             | 168 |
| 29460-E     | –      | 129               | 300        | 540 | 145 | 398            | 490            | 6   | 70             | 52             | 93             | –              | 118            | 175 |
| 29264-E-MB  | –      | 30,3              | 320        | 440 | 73  | 372            | 415            | 3   | 38             | 26             | 44,5           | 51             | –              | 172 |
| 29364-E     | –      | 71                | 320        | 500 | 109 | 396            | 465            | 5   | 53             | 39             | 68             | –              | 90             | 180 |
| 29464-E     | –      | 158               | 320        | 580 | 155 | 432            | 525            | 7,5 | 75             | 56             | 97             | –              | 126            | 191 |
| 29268-E-MB  | –      | 32                | 340        | 460 | 73  | 391            | 435            | 3   | 37             | 26             | 45             | 52             | –              | 183 |
| 29368-E-MB  | –      | 98,9              | 340        | 540 | 122 | 426            | 500            | 5   | 59             | 44             | 75             | –              | –              | 192 |
| 29468-E     | –      | 200               | 340        | 620 | 170 | 458            | 560            | 7,5 | 82             | 61             | 106            | –              | 138            | 201 |
| 29272-E-MB  | –      | 46,5              | 360        | 500 | 85  | 423            | 475            | 4   | 44             | 31             | 51             | 59             | –              | 194 |
| 29372-E-MB  | –      | 103               | 360        | 560 | 122 | 446            | 520            | 5   | 59             | 44             | 75             | 86             | –              | 202 |
| 29472-E-MB  | –      | 219               | 360        | 640 | 170 | 475            | 580            | 7,5 | 82             | 61             | 108            | 121            | –              | 210 |
| 29276-E-MB  | –      | 48,4              | 380        | 520 | 85  | 440            | 490            | 4   | 42             | 31             | 53             | 81             | –              | 202 |
| 29376-E-MB  | –      | 132               | 380        | 600 | 132 | 474            | 555            | 6   | 63             | 48             | 83             | 94             | –              | 216 |
| 29476-E-MB  | –      | 248               | 380        | 670 | 175 | 500            | 610            | 7,5 | 85             | 63             | 111            | 124            | –              | 230 |

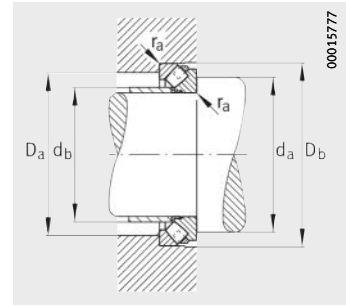




Mounting dimensions  
293...-E, 294...-E,  
293...-E1, 294...-E1



Mounting dimensions  
293...-E1, 294...-E1

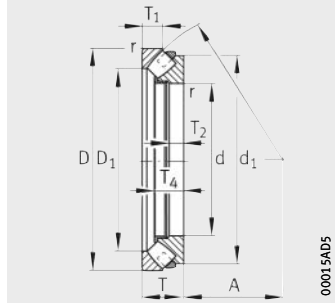


Mounting dimensions  
292...-E(E1)-MB,  
293...-E-MB, 294...-E-MB

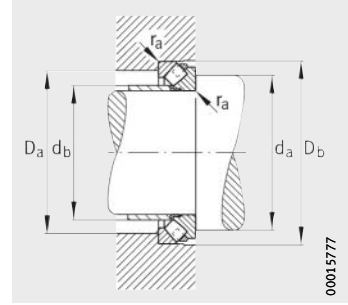
| Mounting dimensions |               |               |               |                  |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ua}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------|------------------|---------------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $D_b$<br>min. | $d_b$<br>max. | $d_{b1}$<br>max. | $r_a$<br>max. | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |                                      |  |   |
| 235                 | 271           | 326           | 176           | 189              | 4             | 2 240               | 6 000                   | 630                                  | 2 200  | 1 090   |
| 250                 | 288           | 346           | 186           | 199              | 4             | 2 550               | 6 900                   | 700                                  | 2 000  | 1 030   |
| 265                 | 305           | 366           | 197           | 210              | 4             | 2 850               | 7 700                   | 770                                  | 1 800  | 940   |
| 250                 | 281           | 325           | 201           | 211              | 3             | 1 680               | 4 850                   | 580                                  | 2 200  | 1 090   |
| 275                 | 322           | 386           | 214           | –                | 4             | 2 320               | 7 500                   | 470                                  | 1 200  | 970   |
| 265                 | 298           | 348           | 213           | 224              | 3             | 1 900               | 5 600                   | 640                                  | 2 000  | 1 030   |
| 290                 | 338           | 406           | 225           | –                | 4             | 2 550               | 8 500                   | 510                                  | 1 100  | 920   |
| 285                 | 316           | 368           | 235           | –                | 3             | 1 560               | 5 600                   | 335                                  | 1 400  | 980   |
| 310                 | 360           | 428           | 243           | –                | 5             | 2 600               | 8 500                   | 520                                  | 1 100  | 860   |
| 290                 | 311           | 344           | 250           | –                | 2             | 1 010               | 4 150                   | 465                                  | 1 800  | 1 070   |
| 300                 | 337           | 390           | 256           | –                | 3             | 1 630               | 6 100                   | 355                                  | 1 400  | 890   |
| 330                 | 381           | 448           | 265           | –                | 5             | 2 700               | 9 500                   | 570                                  | 1 100  | 790   |
| 305                 | 331           | 365           | 272           | –                | 2,1           | 1 060               | 4 750                   | 260                                  | 1 700  | 960   |
| 330                 | 372           | 430           | 277           | –                | 4             | 2 040               | 7 650                   | 445                                  | 1 200  | 810   |
| 360                 | 419           | 488           | 291           | –                | 5             | 3 100               | 11 000                  | 650                                  | 1 000  | 730   |
| 325                 | 351           | 385           | 291           | –                | 2,1           | 1 120               | 5 100                   | 270                                  | 1 500  | 890   |
| 350                 | 394           | 450           | 298           | –                | 4             | 2 120               | 8 300                   | 470                                  | 1 200  | 750   |
| 390                 | 446           | 530           | 310           | –                | 5             | 3 650               | 12 900                  | 750                                  | 900  | 670   |
| 355                 | 386           | 426           | 317           | –                | 2,5           | 1 430               | 6 550                   | 345                                  | 1 400  | 830   |
| 380                 | 429           | 490           | 320           | –                | 4             | 2 550               | 9 650                   | 540                                  | 1 100  | 700   |
| 410                 | 471           | 550           | 326           | –                | 5             | 3 900               | 14 000                  | 810                                  | 900  | 620   |
| 375                 | 406           | 450           | 336           | –                | 2,5           | 1 500               | 6 950                   | 360                                  | 1 300  | 770   |
| 400                 | 449           | 510           | 340           | –                | 4             | 2 650               | 10 600                  | 580                                  | 1 100  | 660   |
| 435                 | 507           | 590           | 354           | –                | 6             | 4 300               | 15 600                  | 890                                  | 800  | 590   |
| 395                 | 427           | 470           | 353           | –                | 2,5           | 1 560               | 7 350                   | 385                                  | 1 300  | 730   |
| 430                 | 484           | 550           | 364           | –                | 4             | 3 250               | 12 900                  | 700                                  | 950  | 600   |
| 465                 | 541           | 630           | 373           | –                | 6             | 5 200               | 19 000                  | 1 070                                | 750  | 530   |
| 420                 | 461           | 510           | 380           | –                | 3             | 1 900               | 8 800                   | 455                                  | 1 200  | 700   |
| 450                 | 504           | 572           | 384           | –                | 4             | 3 350               | 13 400                  | 720                                  | 900  | 570   |
| 485                 | 560           | 650           | 391           | –                | 6             | 5 400               | 20 400                  | 1 130                                | 750  | 495   |
| 440                 | 480           | 530           | 395           | –                | 3             | 2 080               | 9 650                   | 495                                  | 1 100  | 650   |
| 480                 | 538           | 612           | 404           | –                | 5             | 3 900               | 16 000                  | 860                                  | 850  | 530   |
| 510                 | 587           | 682           | 415           | –                | 6             | 5 850               | 22 400                  | 1 220                                | 700  | 465   |



# Axial spherical roller bearings



292...E-MB,  
293...E-MB, 294...E-MB



Mounting dimensions  
292...E-MB,  
293...E-MB, 294...E-MB

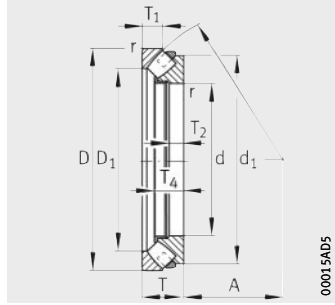
**Dimension table (continued)** · Dimensions in mm

| Designation  | Mass<br>m<br>≈kg | Dimensions |      |     |                |                |           |                |                |                |                |     |
|--------------|------------------|------------|------|-----|----------------|----------------|-----------|----------------|----------------|----------------|----------------|-----|
|              |                  | d          | D    | T   | D <sub>1</sub> | d <sub>1</sub> | r<br>min. | T <sub>1</sub> | T <sub>2</sub> | T <sub>3</sub> | T <sub>4</sub> | A   |
| 29280-E-MB   | 51,2             | 400        | 540  | 85  | 460            | 510            | 4         | 42             | 31             | 53,5           | 62             | 212 |
| 29380-E-MB   | 137              | 400        | 620  | 132 | 493            | 575            | 6         | 64             | 48             | 83             | 94             | 225 |
| 29480-E-MB   | 294              | 400        | 710  | 185 | 530            | 645            | 7,5       | 89             | 67             | 117            | 131            | 236 |
| 29284-E-MB   | 73,4             | 420        | 580  | 95  | 489            | 550            | 5         | 46             | 34             | 60,5           | 70             | 225 |
| 29384-E-MB   | 157              | 420        | 650  | 140 | 520            | 600            | 6         | 68             | 50             | 85             | 97             | 235 |
| 29484-E-MB   | 305              | 420        | 730  | 185 | 550            | 665            | 7,5       | 89             | 67             | 117            | 132            | 244 |
| 29288-E-MB   | 74               | 440        | 600  | 95  | 506            | 570            | 5         | 49             | 34             | 61             | 70             | 235 |
| 29388-E-MB   | 176              | 440        | 680  | 145 | 548            | 630            | 6         | 70             | 52             | 87             | 100            | 245 |
| 29488-E-MB   | 393              | 440        | 780  | 206 | 585            | 710            | 9,5       | 100            | 74             | 128            | 144            | 260 |
| 29292-E-MB   | 76,3             | 460        | 620  | 95  | 528            | 590            | 5         | 46             | 34             | 61             | 70             | 245 |
| 29392-E-MB   | 203              | 460        | 710  | 150 | 567            | 660            | 6         | 72             | 54             | 94,5           | 108            | 257 |
| 29492-E-MB   | 407              | 460        | 800  | 206 | 605            | 730            | 9,5       | 100            | 74             | 128            | 144            | 272 |
| 29296-E-MB   | 90,9             | 480        | 650  | 103 | 556            | 620            | 5         | 55             | 37             | 62             | 71             | 259 |
| 29396-E-MB   | 208              | 480        | 730  | 150 | 587            | 675            | 6         | 72             | 54             | 94             | 107            | 270 |
| 29496-E-MB   | 511              | 480        | 850  | 224 | 630            | 770            | 9,5       | 108            | 81             | 142            | 159            | 280 |
| 292/500-E-MB | 93,5             | 500        | 670  | 103 | 574            | 640            | 5         | 55             | 37             | 63             | 72             | 268 |
| 293/500-E-MB | 216              | 500        | 750  | 150 | 610            | 700            | 6         | 74             | 54             | 92             | 105            | 280 |
| 294/500-E-MB | 525              | 500        | 870  | 224 | 654            | 790            | 9,5       | 107            | 81             | 142            | 160            | 290 |
| 292/530-E-MB | 110              | 530        | 710  | 109 | 612            | 675            | 5         | 57             | 39             | 64             | 74             | 288 |
| 293/530-E-MB | 266              | 530        | 800  | 160 | 646            | 745            | 7,5       | 76             | 58             | 101,5          | 116            | 295 |
| 294/530-E-MB | 621              | 530        | 920  | 236 | 690            | 840            | 9,5       | 114            | 85             | 150,5          | 169            | 309 |
| 292/560-E-MB | 131              | 560        | 750  | 115 | 642            | 715            | 5         | 60             | 41             | 71             | 111            | 302 |
| 293/560-E-MB | 320              | 560        | 850  | 175 | 690            | 790            | 7,5       | 85             | 63             | 105,5          | 121            | 310 |
| 294/560-E-MB | 733              | 560        | 980  | 250 | 729            | 890            | 12        | 120            | 90             | 163            | 182            | 328 |
| 292/600-E-MB | 154              | 600        | 800  | 122 | 688            | 760            | 5         | 65             | 44             | 71,5           | 82             | 321 |
| 293/600-E-MB | 373              | 600        | 900  | 180 | 727            | 840            | 7,5       | 87             | 65             | 113,5          | 129            | 335 |
| 294/600-E-MB | 839              | 600        | 1030 | 258 | 782            | 940            | 12        | 127            | 93             | 162            | 182            | 347 |
| 292/630-E-MB | 195              | 630        | 850  | 132 | 724            | 805            | 6         | 67             | 48             | 82             | 94             | 338 |
| 293/630-E-MB | 437              | 630        | 950  | 190 | 765            | 885            | 9,5       | 92             | 68             | 122            | 138            | 345 |
| 294/630-E-MB | 1030             | 630        | 1090 | 280 | 820            | 995            | 12        | 136            | 101            | 176,5          | 198            | 365 |
| 292/670-E-MB | 228              | 670        | 900  | 140 | 773            | 855            | 6         | 74             | 50             | 81             | 93             | 364 |
| 294/670-E-MB | 1080             | 670        | 1150 | 290 | 869            | 1050           | 15        | 138            | 104            | 186            | 208            | 387 |

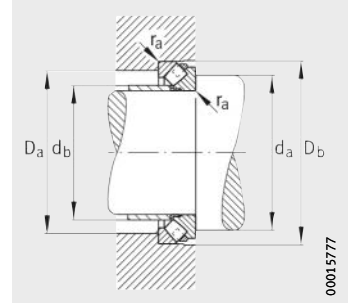


| Mounting dimensions |               |               |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{ua}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $D_b$<br>min. | $d_b$<br>max. | $r_a$<br>max. | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |                                      |  |   |
| 460                 | 500           | 550           | 415           | 3             | 2 120               | 10 200                  | 510                                  | 1 100  | 610   |
| 500                 | 557           | 634           | 424           | 5             | 4 000               | 16 600                  | 880                                  | 850  | 510   |
| 540                 | 622           | 722           | 441           | 6             | 6 400               | 25 000                  | 1 330                                | 670  | 440   |
| 490                 | 534           | 590           | 437           | 4             | 2 650               | 12 500                  | 620                                  | 1 000  | 580   |
| 525                 | 585           | 664           | 447           | 5             | 4 300               | 18 000                  | 940                                  | 800  | 475   |
| 560                 | 643           | 742           | 455           | 6             | 6 700               | 26 000                  | 1 390                                | 630  | 420   |
| 510                 | 554           | 610           | 458           | 4             | 2 650               | 13 400                  | 660                                  | 1 000  | 550   |
| 548                 | 614           | 695           | 470           | 5             | 4 550               | 19 000                  | 990                                  | 750  | 460   |
| 595                 | 684           | 794           | 486           | 8             | 7 650               | 30 000                  | 1 570                                | 600  | 395   |
| 530                 | 575           | 632           | 477           | 4             | 2 700               | 13 400                  | 660                                  | 950  | 530   |
| 575                 | 638           | 726           | 487           | 5             | 5 000               | 21 200                  | 1 120                                | 700  | 440   |
| 615                 | 704           | 815           | 502           | 8             | 7 800               | 31 000                  | 1 620                                | 600  | 380   |
| 555                 | 603           | 662           | 508           | 4             | 2 800               | 14 600                  | 700                                  | 900  | 510   |
| 593                 | 660           | 746           | 507           | 5             | 5 200               | 22 400                  | 1 160                                | 700  | 410   |
| 645                 | 744           | 865           | 521           | 8             | 9 300               | 36 500                  | 1 920                                | 530  | 350   |
| 575                 | 622           | 682           | 527           | 4             | 2 900               | 15 300                  | 740                                  | 900  | 490   |
| 615                 | 683           | 768           | 532           | 5             | 5 100               | 22 800                  | 1 160                                | 700  | 400   |
| 670                 | 765           | 886           | 542           | 8             | 9 300               | 37 500                  | 1 930                                | 530  | 340   |
| 611                 | 661           | 722           | 560           | 4             | 3 100               | 16 300                  | 770                                  | 850  | 465   |
| 650                 | 724           | 818           | 561           | 6             | 6 000               | 26 500                  | 1 350                                | 630  | 375   |
| 700                 | 810           | 937           | 573           | 8             | 10 200              | 41 500                  | 2 160                                | 500  | 320   |
| 645                 | 697           | 762           | 586           | 4             | 3 650               | 19 300                  | 910                                  | 800  | 435   |
| 691                 | 770           | 868           | 595           | 6             | 6 700               | 29 000                  | 1 460                                | 600  | 355   |
| 750                 | 860           | 997           | 606           | 10            | 11 800              | 49 000                  | 2 480                                | 480  | 290   |
| 690                 | 744           | 814           | 633           | 4             | 3 800               | 20 400                  | 960                                  | 750  | 410   |
| 735                 | 815           | 920           | 633           | 6             | 7 350               | 33 500                  | 1 660                                | 560  | 325   |
| 800                 | 900           | 1 055         | 653           | 10            | 12 200              | 52 000                  | 2 600                                | 450  | 275   |
| 730                 | 789           | 864           | 657           | 5             | 4 800               | 25 500                  | 1 180                                | 670  | 375   |
| 839                 | 856           | 970           | 665           | 8             | 8 300               | 38 000                  | 1 830                                | 530  | 305   |
| 840                 | 960           | 1 115         | 681           | 10            | 14 000              | 58 500                  | 2 850                                | 430  | 260   |
| 775                 | 836           | 915           | 710           | 5             | 4 900               | 26 000                  | 1 190                                | 630  | 365   |
| 880                 | 1 015         | 1 175         | 729           | 12            | 15 000              | 64 000                  | 3 150                                | 400  | 245   |

# Axial spherical roller bearings



292...E-MB,  
293...E-MB, 294...E-MB



Mounting dimensions  
292...E-MB,  
293...E-MB, 294...E-MB

**Dimension table** (continued) · Dimensions in mm

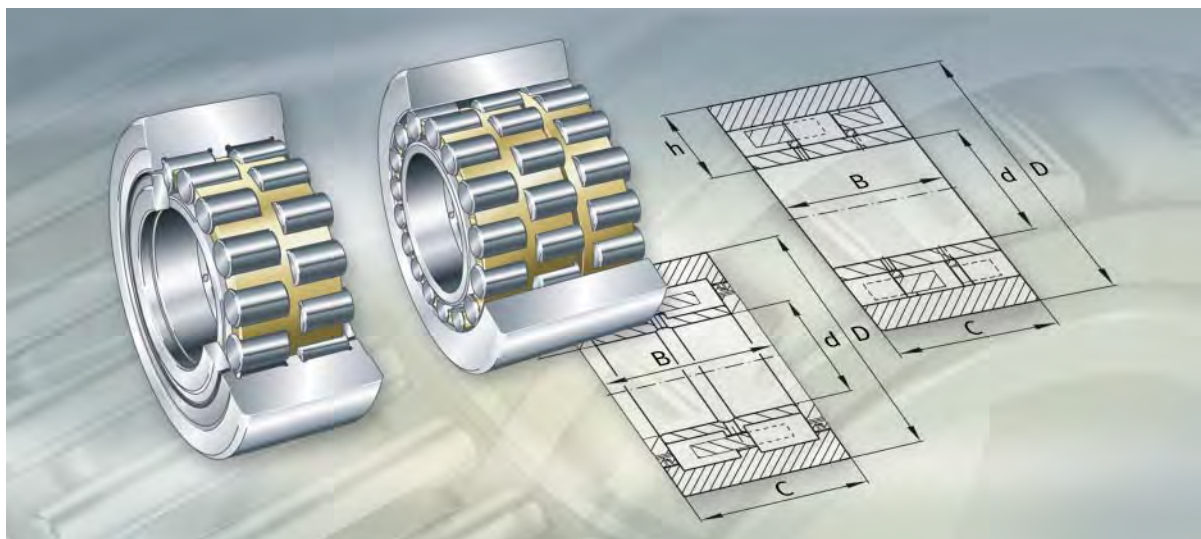
| Designation   | Mass<br>m<br>≈kg | Dimensions |      |     |                |                |           |                |                |                |                |     |
|---------------|------------------|------------|------|-----|----------------|----------------|-----------|----------------|----------------|----------------|----------------|-----|
|               |                  | d          | D    | T   | D <sub>1</sub> | d <sub>1</sub> | r<br>min. | T <sub>1</sub> | T <sub>2</sub> | T <sub>3</sub> | T <sub>4</sub> | A   |
| 292/710-E-MB  | 261              | 710        | 950  | 145 | 815            | 905            | 6         | 75             | 52             | 88             | 101            | 380 |
| 293/710-E-MB  | 590              | 710        | 1060 | 212 | 861            | 990            | 9,5       | 102            | 76             | 132,5          | 150            | 394 |
| 294/710-E-MB  | 1420             | 710        | 1220 | 308 | 916            | 1115           | 15        | 150            | 111            | 198            | 221            | 415 |
| 292/750-E-MB  | 299              | 750        | 1000 | 150 | 861            | 955            | 6         | 81             | 54             | 88             | 100            | 406 |
| 293/750-E-MB  | 716              | 750        | 1120 | 224 | 909            | 1045           | 9,5       | 108            | 81             | 140            | 159            | 415 |
| 294/750-E-MB  | 1130             | 750        | 1280 | 315 | 972            | 1170           | 15        | 152            | 113            | 200            | 225            | 436 |
| 292/800-E-MB  | 341              | 800        | 1060 | 155 | 915            | 1010           | 7,5       | 81             | 56             | 96             | 110            | 426 |
| 293/800-E-MB  | 801              | 800        | 1180 | 230 | 961            | 1100           | 9,5       | 112            | 83             | 145,5          | 165            | 440 |
| 294/800-E-MB  | 1900             | 800        | 1360 | 335 | 1030           | 1245           | 15        | 163            | 121            | 214,5          | 241            | 462 |
| 292/850-E-MB  | 395              | 850        | 1120 | 160 | 963            | 1065           | 7,5       | 82             | 58             | 101,5          | 116            | 453 |
| 293/850-E-MB  | 933              | 850        | 1250 | 243 | 1021           | 1165           | 12        | 118            | 87             | 152            | 173            | 468 |
| 294/850-E-MB  | 1590             | 850        | 1440 | 354 | 1099           | 1315           | 15        | 172            | 127            | 222            | 249            | 490 |
| 292/900-E-MB  | 444              | 900        | 1180 | 170 | 1023           | 1125           | 7,5       | 84             | 61             | 105            | 121            | 477 |
| 293/900-E-MB  | 1060             | 900        | 1320 | 250 | 1068           | 1235           | 12        | 120            | 90             | 158            | 180            | 496 |
| 294/900-E-MB  | 2610             | 900        | 1520 | 372 | 1149           | 1395           | 15        | 180            | 134            | 241            | 266            | 518 |
| 292/950-E-MB  | 548              | 950        | 1250 | 180 | 1079           | 1190           | 7,5       | 90             | 65             | 112            | 129            | 507 |
| 294/950-E-MB  | 3070             | 950        | 1600 | 390 | 1211           | 1470           | 15        | 188            | 140            | 256            | 290            | 546 |
| 292/1000-E-MB | 640              | 1000       | 1320 | 190 | 1139           | 1260           | 9,5       | 98             | 68             | 117,5          | 134            | 540 |
| 294/1000-E-MB | 3400             | 1000       | 1670 | 402 | 1268           | 1530           | 15        | 194            | 145            | 264            | 299            | 581 |
| 292/1060-E-MB | 789              | 1060       | 1400 | 206 | 1208           | 1335           | 9,5       | 108            | 74             | 124            | 142            | 566 |
| 294/1060-E-MB | 4040             | 1060       | 1770 | 426 | 1347           | 1625           | 15        | 205            | 153            | 279            | 317            | 608 |
| 292/1120-E-MB | 832              | 1120       | 1460 | 206 | 1270           | 1395           | 9,5       | 108            | 74             | 125            | 146            | 593 |
| 294/1120-E-MB | 4630             | 1120       | 1860 | 444 | 1419           | 1710           | 15        | 214            | 160            | 290            | 329            | 642 |
| 292/1180-E-MB | 867              | 1180       | 1520 | 206 | 1330           | 1455           | 9,5       | 108            | 74             | 125            | 146            | 625 |
| 294/1180-E-MB | 5280             | 1180       | 1950 | 462 | 1490           | 1795           | 19        | 224            | 166            | 303            | 344            | 673 |
| 292/1250-E-MB | 1020             | 1250       | 1610 | 216 | 1411           | 1540           | 9,5       | 113            | 78             | 131            | 154            | 650 |
| 293/1250-E-MB | 2570             | 1250       | 1800 | 330 | 1465           | 1685           | 15        | 160            | 119            | 208            | 236            | 690 |
| 294/1250-E-MB | 5980             | 1250       | 2050 | 480 | 1573           | 1885           | 19        | 233            | 173            | 314            | 357            | 711 |
| 292/1700-E-MB | 2230             | 1700       | 2160 | 280 | 1900           | 2070           | 12        | 145            | 101            | 170            | 200            | 892 |
| 292/1800-E-MB | 2530             | 1800       | 2280 | 290 | 2012           | 2185           | 15        | 150            | 104            | 175            | 207            | 945 |



| Mounting dimensions |               |               |               |               | Basic load ratings  |                         | Fatigue limit load<br>$C_{Ua}$<br>kN | Limiting speed<br>$n_G$<br>$\text{min}^{-1}$ | Reference speed<br>$n_B$<br>$\text{min}^{-1}$ |
|---------------------|---------------|---------------|---------------|---------------|---------------------|-------------------------|--------------------------------------|--|---|
| $d_a$<br>min.       | $D_a$<br>max. | $D_b$<br>min. | $d_b$<br>max. | $r_a$<br>max. | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |                                      |  |   |
| 820                 | 882           | 966           | 743           | 5             | 5 600               | 30 500                  | 1 390                                | 600  | 335   |
| 869                 | 962           | 1 082         | 752           | 8             | 9 800               | 46 500                  | 2 200                                | 480  | 265   |
| 925                 | 1 073         | 1 250         | 768           | 12            | 17 300              | 75 000                  | 3 600                                | 400  | 224   |
| 863                 | 930           | 1 017         | 798           | 5             | 5 600               | 32 000                  | 1 410                                | 600  | 325   |
| 915                 | 1 015         | 1 142         | 795           | 8             | 10 800              | 51 000                  | 2 420                                | 450  | 255   |
| 1 000               | 1 130         | 1 310         | 812           | 12            | 18 300              | 80 000                  | 3 800                                | 360  | 213   |
| 918                 | 987           | 1 078         | 837           | 6             | 6 550               | 37 500                  | 1 640                                | 530  | 295   |
| 970                 | 1 070         | 1 202         | 842           | 8             | 11 800              | 57 000                  | 2 700                                | 450  | 232   |
| 1 050               | 1 200         | 1 390         | 862           | 12            | 20 800              | 91 500                  | 4 250                                | 340  | 196   |
| 973                 | 1 043         | 1 138         | 881           | 6             | 7 350               | 42 500                  | 1 860                                | 500  | 270   |
| 1 028               | 1 137         | 1 273         | 896           | 10            | 12 900              | 64 000                  | 2 900                                | 430  | 215   |
| 1 119               | 1 229         | 1 470         | 875           | 12            | 22 800              | 100 000                 | 4 700                                | 300  | 184   |
| 1 025               | 1 101         | 1 198         | 933           | 6             | 8 000               | 44 000                  | 1 930                                | 480  | 260   |
| 1 090               | 1 203         | 1 343         | 947           | 10            | 14 300              | 71 000                  | 3 250                                | 400  | 206   |
| 1 170               | 1 345         | 1 555         | 974           | 12            | 25 000              | 114 000                 | 5 300                                | 300  | 172   |
| 1 147               | 1 089         | 1 268         | 983           | 6             | 9 000               | 51 000                  | 2 190                                | 450  | 244   |
| 1 372               | 1 241         | 1 635         | 1 022         | 12            | 27 500              | 129 000                 | 5 800                                | 280  | 158   |
| 1 216               | 1 151         | 1 340         | 1 045         | 8             | 9 800               | 57 000                  | 2 450                                | 430  | 232   |
| 1 435               | 1 298         | 1 705         | 1 074         | 12            | 29 000              | 137 000                 | 6 200                                | 280  | 151   |
| 1 290               | 1 220         | 1 422         | 1 111         | 8             | 10 800              | 64 000                  | 2 700                                | 400  | 218   |
| 1 521               | 1 377         | 1 815         | 1 138         | 12            | 32 500              | 153 000                 | 6 800                                | 260  | 141   |
| 1 350               | 1 280         | 1 482         | 1 196         | 8             | 11 200              | 68 000                  | 2 800                                | 400  | 203   |
| 1 604               | 1 449         | 1 905         | 1 211         | 12            | 35 500              | 170 000                 | 7 400                                | 260  | 132   |
| 1 340               | 1 415         | 1 542         | 1 227         | 8             | 11 200              | 69 500                  | 2 850                                | 360  | 195   |
| 1 683               | 1 520         | 2 007         | 1 267         | 15            | 39 000              | 190 000                 | 8 100                                | 240  | 122   |
| 1 425               | 1 500         | 1 632         | 1 298         | 8             | 12 900              | 80 000                  | 3 150                                | 360  | 179   |
| 1 520               | 1 640         | 1 830         | 1 315         | 12            | 24 000              | 127 000                 | 5 400                                | 280  | 142   |
| 1 771               | 1 603         | 2 107         | 1 338         | 15            | 41 500              | 204 000                 | 8 700                                | 220  | 116   |
| 1 915               | 2 010         | 2 187         | 1 757         | 10            | 21 200              | 140 000                 | 5 300                                | 260  | 127   |
| 2 025               | 2 120         | 2 313         | 1 864         | 12            | 22 800              | 150 000                 | 5 700                                | 260  | 120   |



**FAG**



**Back-up rollers  
for multi-roll cold rolling mills**

# Back-up rollers for multi-roll cold rolling mills

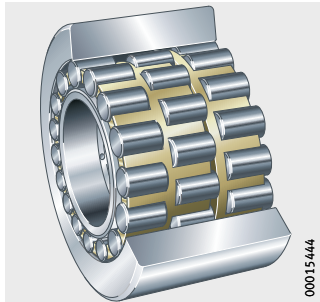
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# Product overview **Back-up rollers for multi-roll cold rolling mills**

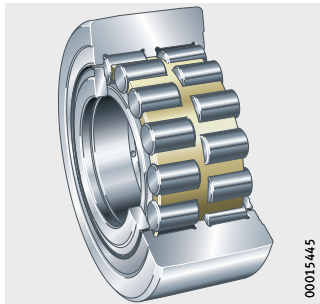
## **Non-locating bearings** Design 1

Z-5..WGTR3



## **Locating bearings** Design 2

Z-5..WGTR2, F-8..WGTR2





# Back-up rollers for multi-roll cold rolling mills

**Features** These back-up rollers were developed for the particular operating conditions in multi-roll cold rolling mills. A detailed description is given in TPI 129, Back-up Rollers for Multi-roll Cold Rolling Mills.

The rolling process requires bearings with high load carrying capacity and high accuracy. The bearings contain cylindrical rollers and have particularly thick-walled, rotating outer rings. The inner rings are located on the stationary support shaft.

The back-up rollers are suitable for high radial forces or high radial forces and axial forces. The important factors for the quality of the rolled sheet metal are the section height tolerance, the running accuracy and the surface quality of the outer ring outside surface of the back-up rollers. They are separable and are therefore easier to mount and dismount.

## Non-locating bearings Design 1

The raceways of these back-up rollers are completely cylindrical. The first and second rows of rollers are guided by a double comb cage, while the third row is guided by a single comb cage. The rollers are guided axially by rib washers on the inner ring.

The simple geometrical form facilitates very high accuracy in production and in the rework of the rollers.

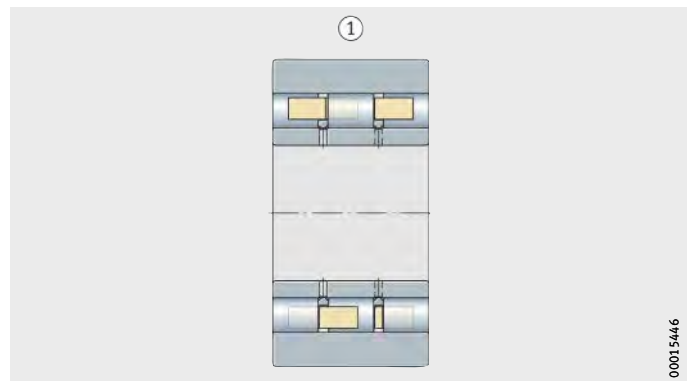
The outer ring must be laterally guided by plain washers in the support saddles. These plain bearings restrict the speed of the rollers and thus the rolling speed.

We supply back-up rollers of Design 1 without seals, *Figure 1*.



① Design 1

*Figure 1*  
Back-up roller

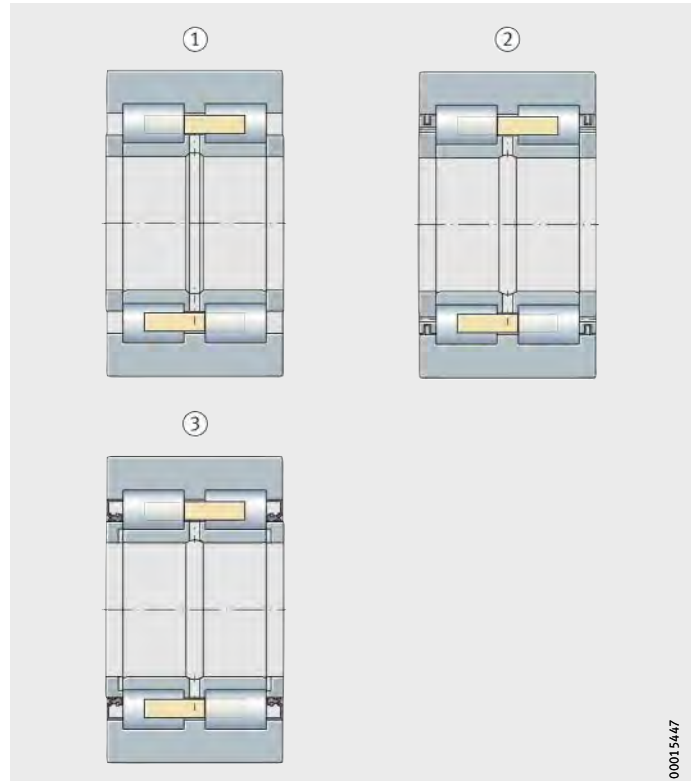


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## Back-up rollers for multi-roll cold rolling mills

### Locating bearings Design 2

The double row back-up rollers of this design have outer rings with three rigid ribs and two loose rib washers on the inner ring. After mounting, the back-up roller is self-retaining and requires no axial guidance. The rollers are guided by a brass double comb cage. In accordance with the lubrication method, these back-up rollers are supplied with or without seals, *Figure 2*.



*Figure 2*  
Back-up rollers of Design 2

**Materials** The inner rings and cylindrical rollers are made from rolling bearing steel. The outer rings can be chill hardened or made from case hardening steel.

**Sealing** Back-up rollers of Design 1 are open. These and open back-up rollers of Design 2 are suitable for rolling emulsion lubrication. For recirculating oil lubrication, back-up rollers of Design 2 with rotary shaft seals are selected. Bearings with gap seals (lamellar rings) are suitable for minimal quantity lubrication.

**Lubrication** Back-up rollers are designed such that the lubricant is distributed uniformly among the rollers and, in the case of back-up rollers lubricated with rolling emulsion, that the rolling emulsion can flow out of the bearings on both sides without hindrance.

Lubrication with rolling emulsion is cost-effective since this is already available in large quantities for the rolling process. Due to the low viscosity of the rolling emulsion, a high volume flow through the bearings is necessary. The high rate of lubricant egress from the back-up rollers prevents the ingress of foreign matter into the bearings. Bearings without seals are suitable for rolling emulsion lubrication.

When using recirculating oil lubrication, the oil flows through the back-up rollers in its own recirculation system. Oils of higher viscosity can thus be used, allowing a longer operating life of the back-up rollers. The design must provide inlet and outlet holes.

For minimal quantity lubrication (pneumatic oil lubrication) an oil should be selected with a viscosity of at least  $220 \text{ mm}^2/\text{s}$ . The supply of lubricant should be agreed with the manufacturer of the lubrication equipment.

**Cages** Back-up rollers for multi-roll mills have solid brass cages.



# Back-up rollers for multi-roll cold rolling mills

## Design and safety guidelines

### Application as back-up roller

The thick-walled outer rings of the back-up rollers can support high radial loads. If these rollers are used on a flat mating track, the outer rings undergo elastic deformation.

Compared with a rolling bearing supported in a housing bore, back-up rollers have a modified load distribution in the bearing.

The basic rating life is calculated using the effective dynamic load rating  $C_{rw}$ .

### Application as bearing

If the back-up rollers are mounted in a housing bore as is normal with rolling bearings, the bearing rating life is calculated using the basic dynamic load rating  $C_r$  of the rolling bearing.

### Equivalent dynamic load

For back-up rollers under dynamic loading, the following applies:

$$P = F_r$$

P kN

Equivalent dynamic bearing load for combined load

$F_r$  kN

Radial dynamic bearing load.

### Accuracy

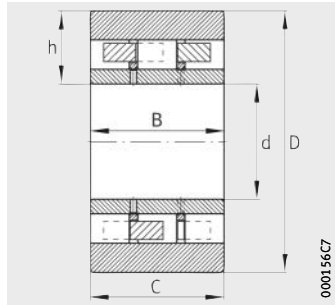
The narrow tolerances for the rolled product require high bearing accuracy, especially in the radial runout of the outer rings and the bearing section height tolerance. This is achieved by heavily restricted manufacturing tolerances and subsequent sorting of all individual parts.

The back-up rollers are sorted in several section height groups. Each back-up roller is marked with the designation of the section height group. Back-up rollers of the same section height group are used for each support shaft. Further information is given in TPI 129, Back-up Rollers for Multi-roll Cold Rolling Mills.

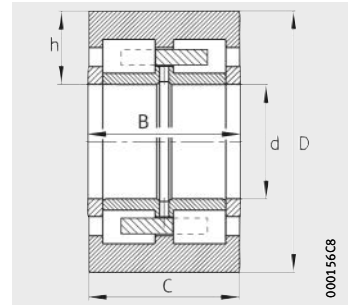


# Back-up rollers

Double row or multi-row



Design 1  
Non-locating bearing



Design 2  
Locating bearing, open

**Dimension table** - Dimensions in mm

| Designation      | Design            | Mass<br>m<br>≈kg | Dimensions |        |        |       |         |
|------------------|-------------------|------------------|------------|--------|--------|-------|---------|
|                  |                   |                  | d          | D      | B      | C     | h       |
| Z-577888.WGTR    | 2 <sup>1)2)</sup> | 54,9             | <b>130</b> | 300,02 | 130    | 129   | 85,01   |
| Z-578270.01.WGTR | 2 <sup>2)</sup>   | 56,5             | <b>130</b> | 300,02 | 132    | 129   | 85,01   |
| Z-564604.WGTR    | 2 <sup>2)</sup>   | 60               | <b>130</b> | 300,02 | 150    | 149   | 85      |
| Z-548963.WGTR    | 2 <sup>1)2)</sup> | 67,4             | <b>130</b> | 300,02 | 161,5  | 160,5 | 85      |
| Z-567455.01.WGTR | 2 <sup>2)</sup>   | 71,3             | <b>130</b> | 300,02 | 172,65 | 171,6 | 85      |
| Z-567998.01.WGTR | 2 <sup>3)5)</sup> | 73,5             | <b>130</b> | 300,02 | 172,65 | 171,6 | 85,01   |
| Z-549722.WGTR    | 2 <sup>2)</sup>   | 73,6             | <b>130</b> | 300,02 | 172,65 | 171,6 | 85,01   |
| Z-549722.01.WGTR | 2 <sup>1)2)</sup> | 73,6             | <b>130</b> | 300,02 | 172,65 | 171,6 | 85,01   |
| Z-512497.03.WGTR | 1 <sup>2)</sup>   | 74,8             | <b>130</b> | 300,02 | 172,64 | 172,6 | 84,955  |
| F-800115.01.WGTR | 2 <sup>1)2)</sup> | 132              | <b>180</b> | 406,42 | 171,04 | 170   | 113,143 |
| Z-564247.02.WGTR | 2 <sup>1)2)</sup> | 125              | <b>180</b> | 406,4  | 171,04 | 170   | 113,2   |
| Z-564247.WGTR    | 2 <sup>2)</sup>   | 125              | <b>180</b> | 406,4  | 171,04 | 170   | 113,2   |
| Z-527502.03.WGTR | 1 <sup>2)</sup>   | 130              | <b>180</b> | 406,42 | 171,04 | 171   | 113,143 |
| Z-543307.01.WGTR | 1 <sup>3)</sup>   | 130              | <b>180</b> | 406,42 | 171,04 | 171   | 113,2   |
| F-809717.WGTR    | 2 <sup>4)</sup>   | 136              | <b>180</b> | 406,42 | 176    | 170   | 113,2   |
| Z-514278.01.WGTR | 1 <sup>2)</sup>   | 150              | <b>180</b> | 406,42 | 217    | 217   | 113,143 |
| F-804209.WGTR    | 2 <sup>2)5)</sup> | 174              | <b>180</b> | 406,4  | 224    | 220   | 113,2   |
| Z-523247.02.WGTR | 1 <sup>2)</sup>   | 169              | <b>180</b> | 406,42 | 224    | 224   | 113,2   |
| Z-523247.03.WGTR | 1 <sup>3)</sup>   | 169              | <b>180</b> | 406,42 | 224    | 224   | 113,2   |

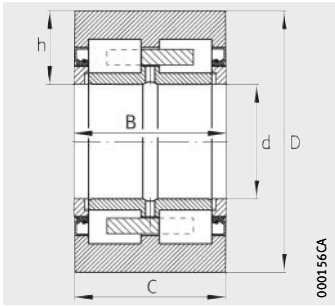
1) Sealing with rotary shaft seals for recirculating oil lubrication.

2) Chill hardened outer ring.

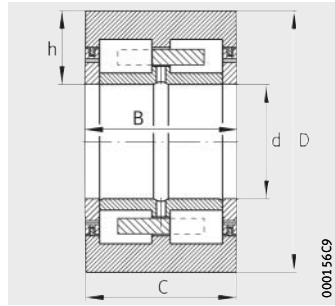
3) Outer ring made from case hardening steel.

4) Back-up roller made from rolling bearing steel (chromium steel).

5) Sealing with lamellar rings for minimal quantity lubrication.



Design 2  
With rotary shaft seal<sup>1)</sup>



Design 2  
With gap seals<sup>5)</sup>

Basic load ratings

| Bearing             |                         | Back-up roller         |                          |
|---------------------|-------------------------|------------------------|--------------------------|
| dyn.<br>$C_r$<br>kN | stat.<br>$C_{0r}$<br>kN | dyn.<br>$C_{rw}$<br>kN | stat.<br>$C_{0rw}$<br>kN |
| 1 040               | 1 560                   | 760                    | 1 180                    |
| 1 040               | 1 560                   | 760                    | 1 180                    |
| 1 200               | 1 860                   | 890                    | 1 450                    |
| 1 200               | 1 880                   | 910                    | 1 490                    |
| 1 440               | 2 370                   | 1 010                  | 1 680                    |
| 1 440               | 2 370                   | 1 010                  | 1 680                    |
| 1 440               | 2 370                   | 1 010                  | 1 680                    |
| 1 440               | 2 370                   | 1 010                  | 1 680                    |
| 1 500               | 2 700                   | 1 030                  | 1 810                    |
| 1 570               | 2 650                   | 1 170                  | 2 040                    |
| 1 710               | 3 000                   | 1 250                  | 2 190                    |
| 1 710               | 3 000                   | 1 250                  | 2 190                    |
| 2 080               | 3 850                   | 1 420                  | 2 550                    |
| 2 080               | 3 850                   | 1 420                  | 2 550                    |
| 1 710               | 3 000                   | 1 250                  | 2 190                    |
| 2 500               | 4 900                   | 1 720                  | 3 250                    |
| 1 910               | 3 450                   | 1 420                  | 2 600                    |
| 2 600               | 5 100                   | 1 790                  | 3 350                    |
| 2 600               | 5 100                   | 1 790                  | 3 350                    |









## Spherical plain bearings



Technical principles

Spherical plain bearings, maintenance-free

Spherical plain bearings, requiring maintenance

# Spherical plain bearings

## **Spherical plain bearings** ..... **874**

Spherical plain bearings are ready-to-fit, standardised machine elements. The outer ring with its concave inner slideway and the inner ring with its crowned outer slideway facilitate spatial adjustment motion.

In the large bearing range, the bearings are available as radial and axial spherical plain bearings. They can support static loads, are suitable for tilting and swivel motion, compensate for shaft misalignment, are not subject to edge stresses under misalignment and allow substantial manufacturing tolerances in the adjacent construction.

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## **Maintenance-free** ..... **874**

These spherical plain bearings are completely maintenance-free. They are used where particular requirements for operating life apply in conjunction with maintenance-free operation or where, for reasons of lubrication, bearings with metallic sliding contact surfaces are not suitable, for example under unilateral load.

The standard sliding layer used is ELGOGLIDE®-800.

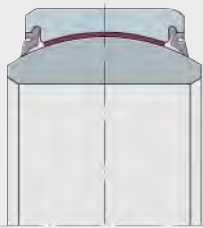
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## **Requiring maintenance** ..... **890**

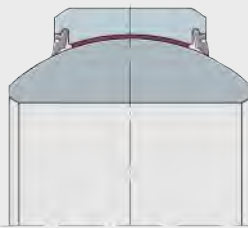
These bearings correspond in their construction to the maintenance-free designs but are lubricated via the outer and inner ring.

They transmit movements and forces with low moment levels – thus keeping bending stresses away from the construction elements – and are particularly suitable for alternating loads with impact and shock type stresses.

The sliding contact surface is the metallic combination steel/steel.



GE..UK-2RS



GE..FW-2RS



GE..-AW



GE..-DW

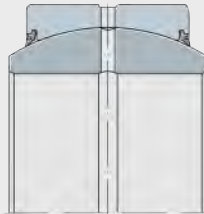


GE..-DW-2RS2

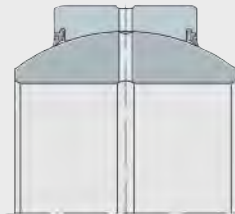
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GE..-DO

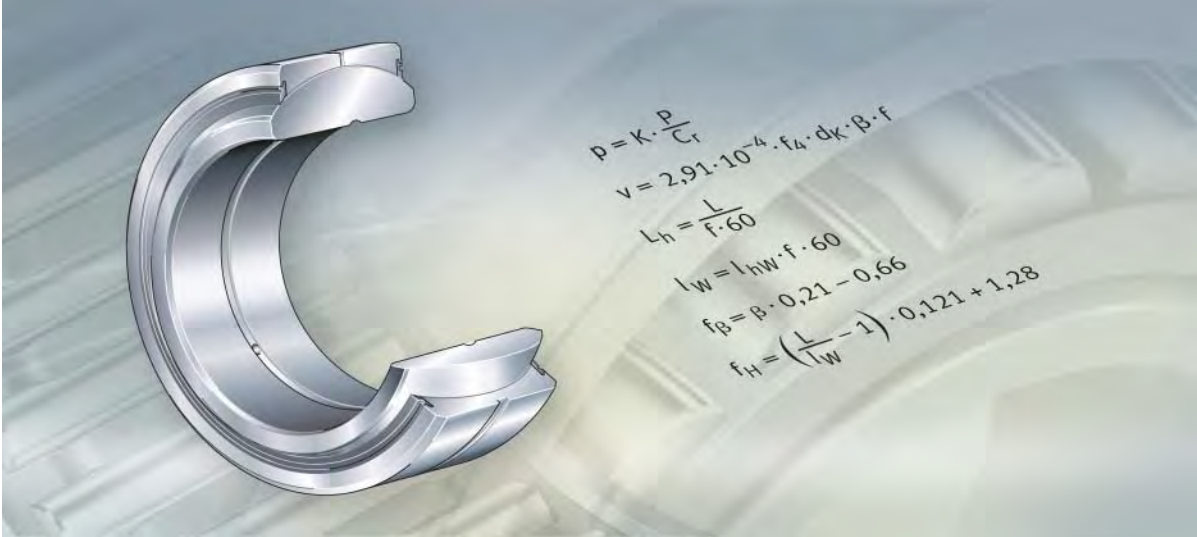


GE..-DO-2RS



GE..-FO-2RS

0001584A



## Technical principles

Load carrying capacity and life

Friction

Sliding layers for maintenance-free spherical plain bearings

Lubrication

Internal clearance

Design of bearing arrangements

Mounting and dismounting

# Technical principles

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# Technical principles

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# Load carrying capacity and life

## Basic load ratings

Basic load ratings are bearing-specific key data that are not standardised and may differ from manufacturer to manufacturer. They are derived from the material-specific load parameters  $K$  and the projected load-bearing area of the bearing in each case.

## Basic dynamic load rating

The basic dynamic load rating  $C_r$  ( $C_a$ ) is used in cases of dynamic loading. A spherical plain bearing is subjected to dynamic loading if it performs swivel, tilting or rotary motion under load.

The basic dynamic load rating is the maximum permissible dynamic load. It can only be utilised to the full if the load acts in a purely radial manner in radial spherical plain bearings and in a purely axial, concentric manner in axial spherical plain bearings.

If the basic dynamic load rating is utilised to the full, there is often a considerable reduction in the operating life of the bearings. The degree to which the basic load rating is utilised should therefore always be matched to the required operating life, see also section Predimensioning, page 856.

## Basic static load rating

The basic static load rating  $C_{0r}$  ( $C_{0a}$ ) is used if a spherical plain bearing is subjected to load while stationary.

It indicates the load that the spherical plain bearing can support at room temperature without damage to the sliding surfaces. This is subject to the precondition that the components adjacent to the bearing must prevent deformation of the bearing.



If the basic load rating  $C_{0r}$  ( $C_{0a}$ ) is utilised to the full, the shaft and housing must be made from high strength materials.









# Load carrying capacity and life

## Operating life

The operating life is the number of motion cycles or operating hours achieved in practice by a spherical plain bearing. It may differ from the calculated theoretical rating life.

The operating life is dependent on factors including:

- the type and magnitude of load
- any shocks occurring
- the sealing arrangement
- corrosion
- contamination
- maintenance.

## Dimensioning of spherical plain bearings

The required size of a spherical plain bearing depends on the requirements placed on its rating life, load carrying capacity and operational reliability.

## Predimensioning

If the basic dynamic load rating  $C_r$  ( $C_a$ ) is utilised to the full, there is often a considerable reduction in the operating life of bearings with metallic sliding surfaces. The degree to which the basic load rating is utilised should therefore always be matched to the required operating life. This is indicated by the ratio  $C_r$  ( $C_a$ )/ $P$ .



The ratio  $C_r$  ( $C_a$ )/ $P$  must not be less than 1.

Depending on the application and bearing type, it is between 1 and 10.

Predimensioning is not a substitute for more extensive bearing calculation.

The load ratios  $C_r$  ( $C_a$ )/ $P$  required for predimensioning of maintenance-free spherical plain bearings or spherical plain bearings requiring maintenance are shown in the tables.

### Load ratio for maintenance-free spherical plain bearings under dynamic load – guide values

| Spherical plain bearing<br>Series | Ratio $C_r$ /P or $C_a$ /P |                      |
|-----------------------------------|----------------------------|----------------------|
|                                   | Alternating load           | Unilateral load      |
| GE...UK-2RS                       | suitable at $\geq 2$       | suitable from 5 to 1 |
| GE...FW-2RS                       | suitable at $\geq 2$       | suitable from 5 to 1 |
| GE...DW                           | suitable at $> 2$          | suitable from 3 to 1 |
| GE...DW-2RS2                      | suitable at $> 2$          | suitable from 3 to 1 |
| GE...AW                           | suitable at $\geq 2$       | suitable from 5 to 1 |

### Load ratio for spherical plain bearings requiring maintenance under dynamic load – guide values

| Spherical plain bearing<br>Series | Ratio $C_r$ /P       |                        |
|-----------------------------------|----------------------|------------------------|
|                                   | Alternating load     | Unilateral load        |
| GE...DO-2RS                       | suitable from 3 to 1 | suitable from 4 to 1,7 |
| GE...DO                           | suitable from 3 to 1 | suitable from 4 to 1,7 |
| GE...FO-2RS                       | suitable from 3 to 1 | suitable from 4 to 1,7 |

# Friction and increases in temperature

Friction is essentially dependent on:

- the sliding contact surface
- the load
- the sliding velocity
- the bearing temperature
- the lubrication condition
- the quality of the sliding surfaces.



Maintenance-free spherical plain bearings must not be lubricated. The PTFE particles to be transferred do not adhere to oily surfaces. Lubricant therefore prevents the necessary smoothing of the surface.

If spherical plain bearings that have undergone dry running-in are then lubricated, this damages the internal tribology and reduces the operating life.

## Friction behaviour

The friction behaviour changes during the operating life.

Bearings that have been well run in give the lowest friction values. During the running-in and failure phases, the values are sometimes significantly higher.

For the running-in phase of maintenance-free spherical plain bearings, see page 858.



# Friction and increases in temperature

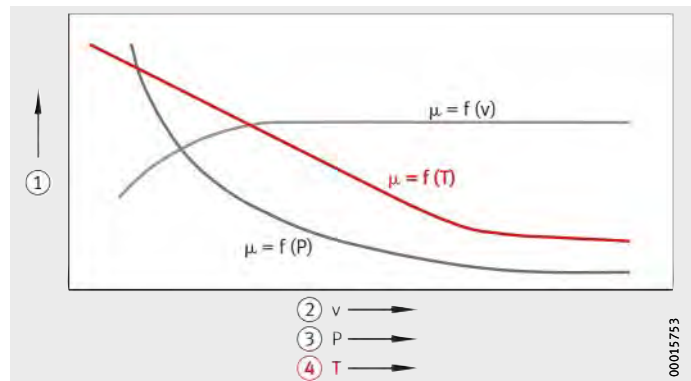
## Running-in phase of maintenance-free spherical plain bearings

During the running-in phase, PTFE particles are transferred from the sliding layer of the outer ring to the opposing running surface of the inner ring. This fills in the areas of slight roughness in the inner ring surface. A long operating life is only achieved with this tribologically smooth surface.

With new spherical plain bearings, the bearing frictional torque may be significantly higher during the early running-in phase due to:

- plastic moulding of the PTFE material onto the surface structure of the opposing running surface
- the as yet incomplete internal bearing tribology, the deposit of PTFE particles on the opposing running/functional surface (PTFE/PTFE friction), *Figure 3*.

- ① Coefficient of friction  $\mu$
- ② Sliding velocity  $v$
- ③ Load  $P$
- ④ Temperature  $T$

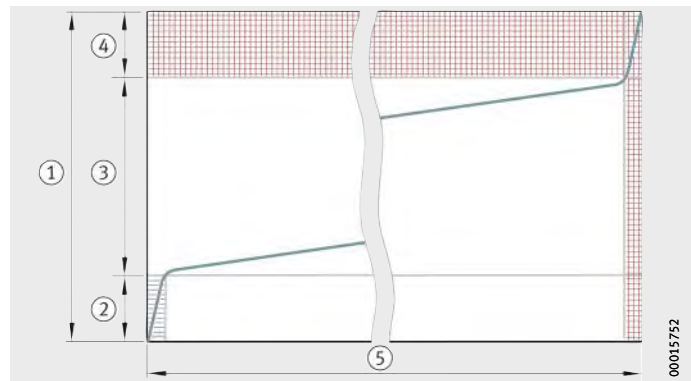


*Figure 3*  
Friction behaviour of maintenance-free sliding materials based on PTFE

## Wear behaviour

The wear behaviour of maintenance-free spherical plain bearings is shown in *Figure 4*.

- ① Wear
- ② Running-in phase
- ③ Main wear phase
- ④ Failure phase
- ⑤ Rating life



*Figure 4*  
Wear behaviour of maintenance-free spherical plain bearings

# Sliding layers for maintenance-free spherical plain bearings

## ELGOGLIDE® sliding layers

Maintenance-free spherical plain bearings have special sliding layers based on PTFE (polytetrafluorethylene).

In terms of performance capability, these are:

- ELGOGLIDE®, *Figure 5*
  - ELGOGLIDE®-800, the highest performance sliding layer
  - ELGOGLIDE®-600, the sliding layer for low friction.

These materials form the slideway of the outer ring or the housing locating washer. They transmit the forces occurring and perform the lubrication function. Additional lubrication of the bearings must not be carried out.

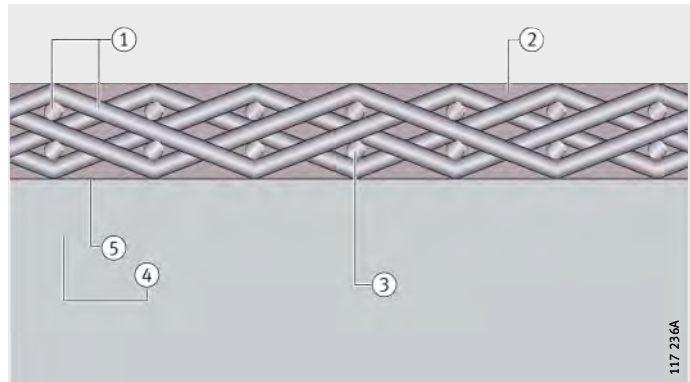
The sliding layer comprises 0,5 mm thick ELGOGLIDE®, is embedded in synthetic resin and attached by a high strength bond to the supporting body, *Figure 5*.

The flow behaviour of the sliding layer is, in conjunction with the supporting body, almost negligible even under very high load.

The adhesive bond is resistant to moisture and does not undergo swelling.

- ① PTFE fabric, comprising PTFE and support fibres
- ② Resin matrix
- ③ Support fibres
- ④ Steel support body
- ⑤ Adhesive bond

*Figure 5*  
ELGOGLIDE®,  
cross-section  
ELGOGLIDE® designs



For the different requirements, the following are available:

- ELGOGLIDE®-800  
The standard material for very high contact pressures from 25 N/mm<sup>2</sup> to 300 N/mm<sup>2</sup> and a long operating life.
- ELGOGLIDE®-600  
The material for contact pressures from 1 N/mm<sup>2</sup> to 100 N/mm<sup>2</sup> and with low coefficients of friction even at low contact pressures.
- ELGOGLIDE®-800-X-life  
In the series GE..-DW, GE..-DW-2RS2 and GE..-AW, this material combines high load carrying capacity with low coefficients of friction and low running-in wear. This material is only available in the series indicated.

# Lubrication

## Principles

Large spherical plain bearings requiring maintenance and with a steel/steel sliding contact surface must be lubricated. They are subjected to a special surface treatment and supplied already provided with MoS<sub>2</sub>. Nevertheless, the quality of maintenance has a considerable influence on the function and wear of spherical plain bearings.

## Functions of the lubricant

The lubricant should:

- reduce friction
- form a lubricant film sufficiently capable of supporting loads on the contact surfaces and thus prevent wear and premature fatigue
- provide the bearing with additional protection against contamination if grease lubrication is used
- give protection against corrosion.



It is more important to use a suitable lubricant than to provide generously defined, short lubrication intervals. The lubricant must always be chosen in consultation with lubricant manufacturers.

## Criteria for lubricant selection

In the case of grease lubrication, the following criteria must be considered:

- the load
- the load direction
- the swivel angle
- the sliding velocity
- the ambient temperature
- the environmental conditions.

Suitable lubricants have a content of approx. 3% MoS<sub>2</sub> or solid additives based on calcium and zinc phosphate compounds. Even under high contact pressure, these additives separate the sliding surfaces from each other.

**Grease lubrication** For standard applications with a steel/steel sliding contact surface, suitable greases are conventional, corrosion-inhibiting, high-pressure types with a lithium soap base, EP additives and solid lubricant additives.

**Running-in phase** The running-in phase has a significant influence on the later wear behaviour of the bearing. Correct lubrication is therefore of particular importance at this point.

During running-in, the surfaces of the contact zones undergo smoothing and elastic moulding. This gives additional load-bearing areas and reduces the strain on the material.

**Guidelines on greasing** During the running-in phase, the pressure in the bearing is particularly high. Spherical plain bearings are therefore manganese phosphated and treated with MoS<sub>2</sub>. The running-in wear phase proceeds all the more favourably the more MoS<sub>2</sub> is embedded in the porous-crystalline manganese phosphate.

This process is most effective if the bearing runs undergoes ten swivel movements under load without additional greasing and is then provided with its initial greasing.

If this is not possible, the initial greasing must be metered carefully in order to avoid flushing an excessive quantity of MoS<sub>2</sub> out of the bearing.

**Relubrication** During relubrication, old grease is replaced by fresh grease. At the same time, the grease flushes wear debris and contaminants out of the bearing.



The bearings must be relubricated periodically. The relubrication intervals should not be established arbitrarily but determined by calculation or in consultation with the lubricant manufacturer.

If relubrication is carried out too frequently, the operating life of the bearing may be reduced, since the friction of spherical plain bearings always increases for a short time after relubrication.

**Relubrication conditions** The grease used for relubrication must be the same as that used in initial greasing.

If other greases are used, the miscibility and compatibility of the greases must be checked.

Relubrication should always be carried out as follows:

- with the bearing still warm from operation
- before the bearing comes to rest if safe to do so
- before extended breaks in operation.

Relubrication should continue until a fresh collar of grease appears at the seal gaps. Old grease must be allowed to leave the bearing unhindered.



Spherical plain bearings requiring maintenance must be lubricated via the outer and inner ring.



# Internal clearance

## Radial internal clearance of radial spherical plain bearings requiring maintenance

The radial internal clearance of spherical plain bearings requiring maintenance and with a steel/steel sliding contact surface is defined as the distance by which the inner ring can be moved in a radial direction relative to the outer ring from one extreme position to the precisely opposite extreme position.

The radial internal clearance is, in accordance with DIN ISO 12240-1, subdivided into three groups, see table.

This is subject to the precondition that the housing bore, apart from the correction of geometrical inaccuracies, causes no dimensional changes in the bearing.

### Radial internal clearance groups

| Internal clearance group | Description  | Standard    | Application   |
|--------------------------|--|-------------|---|
| CN                       | <ul style="list-style-type: none"> <li>■ Normal radial internal clearance</li> <li>■ CN is not included in bearing designations</li> </ul> | ISO 12240-1 | Under normal operating conditions and with the recommended fits, this gives optimum operating clearance |
| C2 <sup>1)2)</sup>       | <ul style="list-style-type: none"> <li>■ Internal clearance &lt; CN (suffix C2)</li> </ul>   |             | For bearing arrangements with very small clearance  |
| C3                       | <ul style="list-style-type: none"> <li>■ Internal clearance &gt; CN (suffix C3)</li> </ul>   |             | For bearing rings with press fits or a large temperature differential between the inner and outer ring  |

1) Relubrication only possible with a tilt angle  $\alpha = 0^\circ$ .

2) Example of bearing with restricted internal clearance: GE220-DO-2RS-C2.

## Axial internal clearance

The axial internal clearance is defined as the distance by which the inner ring can be moved in an axial direction relative to the outer ring from one extreme position to the precisely opposite extreme position.

It is dependent on the bearing geometry and is in a direct relationship with the radial internal clearance.

Depending on the bearing type, it may be several times greater than the radial internal clearance.



# Design of bearing arrangements

## Design of shaft and housing bore

The seating surfaces of the bearings should be designed such that the forces transmitted through the bearing:

- do not cause unacceptable geometrical changes to the shaft and housing
- do not cause permanent deformation of the spherical plain bearing.



Where spherical plain bearings are subjected to high loads of  $p \geq 80 \text{ N/mm}^2$ , the shaft and housing must be checked.

Recommendations for the surface quality (shaft and housing bore) are given in the values according to the table.

## Roughness values of bearing seating surfaces

| Bearing seating surface | Roughness <sup>1)</sup><br>μm |
|-------------------------|-------------------------------|
| Shaft                   | $\leq R_z 10$                 |
| Housing bore            | $\leq R_z 16$                 |

<sup>1)</sup> If larger roughness values are present, please contact us.

## Radial location of spherical plain bearings

In spherical plain bearings, the sliding motion should take place between the curved sliding surfaces of the inner and outer ring. The quality and treatment of the surface is matched to this requirement. The internal clearance and osculation of the sliding surfaces must therefore be in a balanced relationship.

## Spherical plain bearings requiring maintenance

The operating life of spherical plain bearings requiring maintenance is reduced by:

- preload on the sliding surfaces
- excessively small load-bearing areas on the sliding surfaces due to unacceptably large internal clearance.

Recommendations for fits: see table.



If tighter fits are necessary, for example under high, impact type loads, the operating clearance must be checked by means of calculation.

## Shaft and housing fits

| Spherical plain bearing        | Internal clearance group | Material                     |                                    |
|--------------------------------|--------------------------|------------------------------|------------------------------------|
|                                |                          | Housing/shaft<br>Steel/steel | Housing/shaft<br>Light metal/steel |
| Radial spherical plain bearing | C2                       | K7/j6                        | M7/j6                              |
|                                | CN (normal)              | M7/m6                        | N7/m6                              |
|                                | C3                       | M7/m6                        | N7/m6                              |
| Axial spherical plain bearing  | –                        | M7/n6                        | –                                  |



# Design of bearing arrangements

## Maintenance-free spherical plain bearings

Looser fits may be used with maintenance-free spherical plain bearings. Due to the sliding contact surface hard chromium/PTFE, the bearing friction in this case is lower than that of spherical plain bearings requiring maintenance.

Recommendations for fits: see table.

### Shaft and housing fits

| Spherical plain bearing        | Bore d        | Material                  |                                 |
|--------------------------------|---------------|---------------------------|---------------------------------|
|                                |               | Housing/shaft Steel/steel | Housing/shaft Light metal/steel |
| Radial spherical plain bearing | $\leq 300$ mm | K7/j6                     | M7/j6                           |
|                                | $> 300$ mm    | J7/j6                     | –                               |
| Axial spherical plain bearing  | –             | M7/m6                     | –                               |

## Application as locating bearings

The shaft and bore fits must be selected such that no sliding motion occurs on the shaft or in the housing bore. Tight fits prevent damage to the adjacent construction.

If tight fits are present, elastic deformations of the bearing rings reduce the internal clearance of the spherical plain bearing.

These deformations occur as a result of:

- interference between the housing and outer ring (constriction of the outer ring)
- interference between the shaft and bearing bore (expansion of the inner ring).

If a tight fit is not possible, the bearing rings must be secured against axial sliding motion on the shaft or in the housing, see section Axial location of spherical plain bearings, page 865.

## Application as non-locating bearings (between shaft and bearing bore)

The surface of the shaft must be wear-resistant as follows:

- surface hardness  $\geq 56$  HRC
- surface roughness  $\leq R_z10$ .



Spherical plain bearings requiring maintenance should then only be lubricated via the shaft.

## Axial location of spherical plain bearings

Spherical plain bearings under high loads undergo elastic deformation. This leads to relative micromovements in the fits. As a result, the bearing rings can creep in an axial direction despite a tight fit.



In order to prevent axial displacement, the bearing rings must always be located axially.

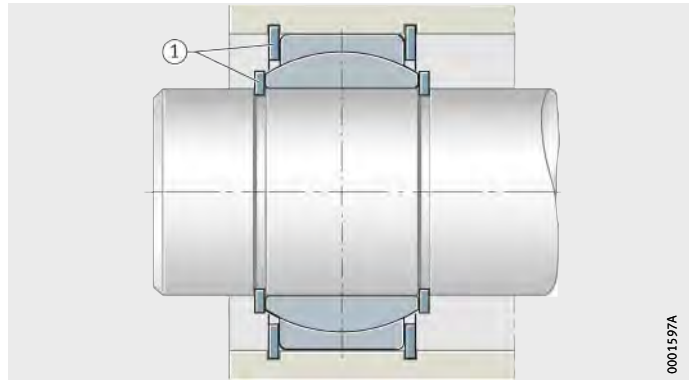
## Non-locating bearing side

The axial displacement should occur between the shaft and bearing bore because:

- the length/diameter ratio of the guidance is more favourable at this point than on the outer ring of the bearing
- the axially split outer ring expands under axial load and can therefore jam in the bearing location
- no wear should occur in the housing bore.

## Location by retaining rings

Location can usefully be carried out using retaining rings, which allow the bearings to be easily mounted and dismantled, *Figure 6*.



① Retaining rings

*Figure 6*  
Location by retaining rings

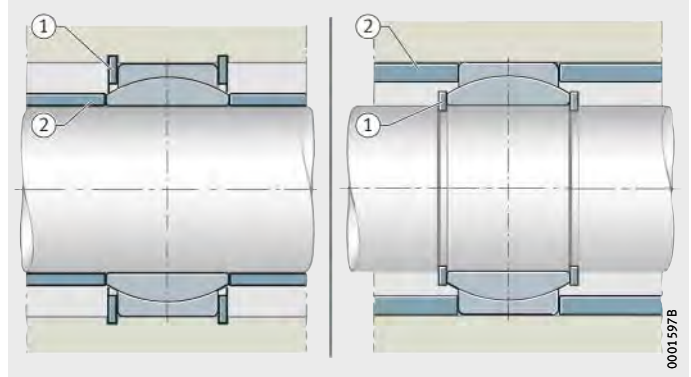
# Design of bearing arrangements

## Location by spacer rings

Spacer rings between the bearing ring and adjacent component are suitable if the shaft must not be weakened by annular slots or the bearings are to be axially preloaded, *Figure 7*.

Axial preload prevents rotary motion between the bearing ring and adjacent construction even with a loose fit.

- ① Retaining rings
- ② Spacer rings



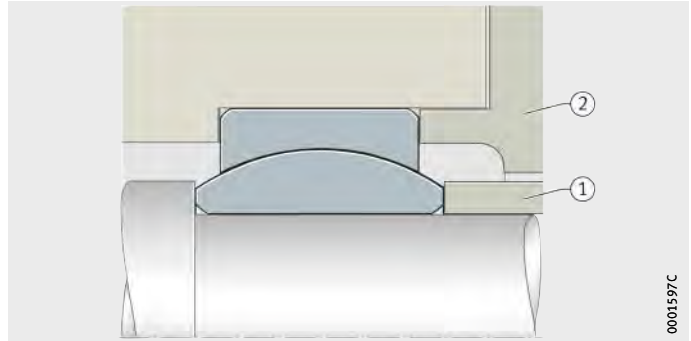
*Figure 7*

Location by retaining rings and spacer rings

## Location by spacer sleeve and sealing cover

It is also possible to locate spherical plain bearings with the aid of a spacer sleeve or end plate and a sealing cover, *Figure 8* and *Figure 9*.

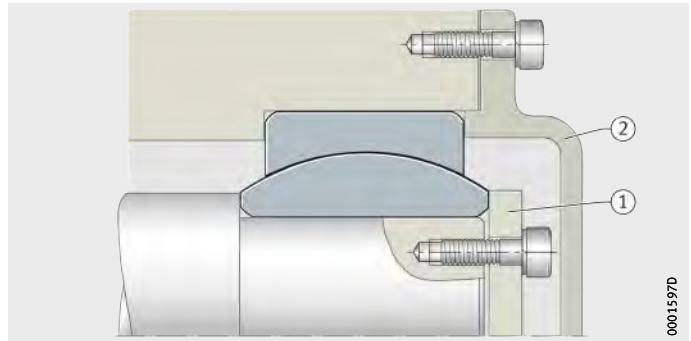
- ① Spacer sleeve
- ② Sealing cover



*Figure 8*

Location by spacer sleeve and sealing cover

- ① End plate
- ② Sealing cover



*Figure 9*

Location by end plate and sealing cover

## Sealing of the bearing position

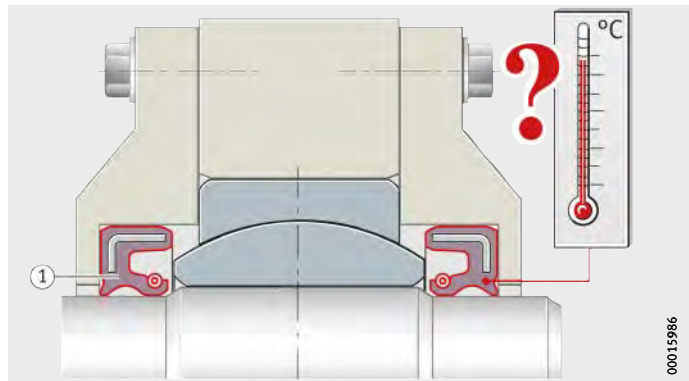
Additional sealing ensures a long operating life and simultaneously acts to prevent the ingress of contamination and moisture.

In the design (selection) of this sealing arrangement, it must be borne in mind that the clearance of the bearing arrangement increases due to the wear of the sliding layer.

If bearings are subjected to higher temperatures, an open bearing with external heat-resistant seals can be used, *Figure 10*.

① Rotary shaft seal

*Figure 10*  
Open spherical plain bearing  
with external seals



# Mounting and dismounting

## Mounting

Spherical plain bearings must be handled very carefully both before and during mounting. Problem-free functioning is substantially dependent on the care taken in mounting. The bearings will only achieve their maximum operating life and functional capability if they are mounted correctly.

## Guidelines



The guidelines on mounting must be observed.

If not, there is a direct or indirect hazard to personnel, the product or the adjacent construction.

The assembly area must be kept clean and free from dust.

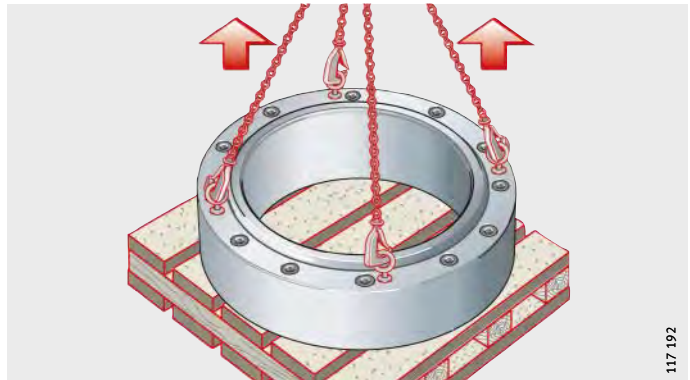
The bearings must be protected against moisture and aggressive media.

The bearings must always be located concentrically.

Mounting may only be carried out by trained personnel.

If bearings are mounted incorrectly, no liability can be accepted.

Large spherical plain bearings should only be transported using the eye bolts supplied and have threaded holes on the end faces of the inner and outer rings for this purpose, *Figure 11*.



*Figure 11*

Transport by means of eye bolts

## Delivered condition and storage

The surface of spherical plain bearings is coated with a preservative. Any change, irrespective of the bearing type, will reduce the operating life.

The bearings must only be stored:

- in the original packaging
- in dry, clean rooms with the temperature as constant as possible
- at a relative humidity of max. 65%.

## Unpacking of bearings

Spherical plain bearings should only be removed from their packaging immediately before mounting:

- Hands should be kept clean and dry and protective gloves worn if necessary (perspiration leads to corrosion).
- If the original packaging is damaged, the products must be checked.
- If the products are contaminated, they must be wiped with a clean cloth only.

### Tools for thermally assisted mounting

In order to reduce the forces required for mounting, the spherical plain bearings can be heated: heating cabinets with a controllable thermostat are suitable for heating. The advantages include uniform heating, no contamination of components and the absence of long preheating times.



Local overheating should be avoided; the bearing temperature must be monitored using a thermometer.

Information in the catalogue and the manufacturer's data on grease and seals must be observed.

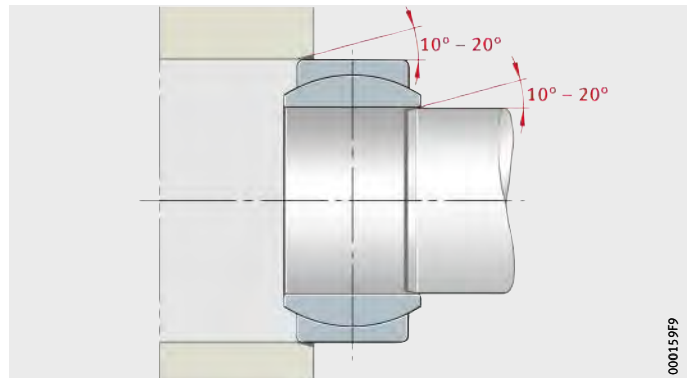
### Checking the adjacent construction

Before spherical plain bearings are mounted, the adjacent construction must be checked for the following:

- the quality of the bearing seating surfaces of the shaft and housing bore
- the dimensional and geometrical accuracy of the seating and locating faces
- the shaft and housing seat
- the lead chamfer on the shaft and housing bore from  $10^\circ$  to  $20^\circ$ , *Figure 12*.

Any burrs present must be removed.

If tight fits are present or mounting conditions present difficulties, the surface of the shaft and housing bore should be lightly oiled.



*Figure 12*  
Lead chamfers

# Mounting and dismounting

## Mechanical assistance



Avoid direct blows with a hammer and drift on the end faces of the bearing rings, since this can lead to microcracks in the bearing.

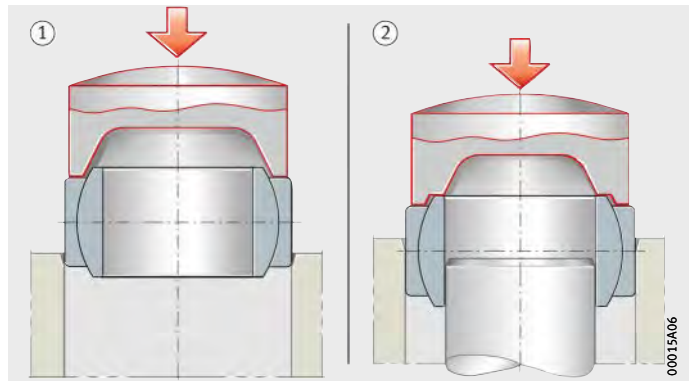
Always apply mounting forces to the bearing ring to be mounted, *Figure 13*. If these forces are directed through the sliding surfaces, this could lead to jamming of the bearings during mounting.

When mounting the bearings on a shaft and in a housing, mounting tools must be used that act simultaneously on the end faces of the inner and outer ring, *Figure 13*.

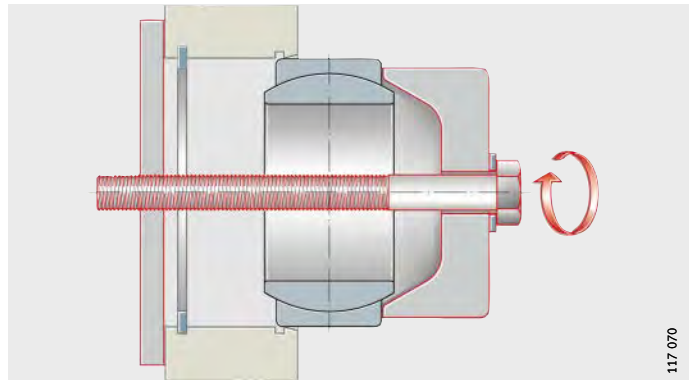
Larger bearings must be mounted using special mounting equipment, *Figure 14*. As the bearing diameter increases, so do the mounting forces required and simple impact type tools are no longer adequate in these cases.

- ① Mounting in housing
- ② Simultaneous mounting on shaft and in housing

*Figure 13*  
Mounting forces and bearing ring to be mounted



*Figure 14*  
Special mounting equipment for larger bearings





## Thermal assistance

In order to reduce the mounting forces, spherical plain bearings can be heated.



Do not heat bearings to more than +130 °C, since higher temperatures will damage the seals in sealed bearings.

Do not heat spherical plain bearings in an oil bath.

In bearings with a steel/steel sliding contact surface, this will change the concentration of molybdenum disulphide on the sliding surfaces.

Do not heat bearings using a naked flame.

The material undergoes excessive localised heating, reducing its hardness.

Stresses also occur in the bearing and seals may melt.

Maintenance-free sliding layers could be damaged.

## Mounting by means of refrigeration

The structure of the rings of spherical plain bearings will change at temperatures below –61 °C. Due to the structural change, their volume may increase; the change to the tolerances may lead to jamming of the bearing.

If this mounting method is to be used, the bearing rings can be supplied with appropriate heat treatment. In this case, please contact us.

## Adhesive bonding of bearing rings

If the recommended fits are adhered to, adhesive bonding of the bearing rings is not generally necessary.

Adhesives may only be used on spherical plain bearings with a steel/steel sliding contact surface under the following conditions:

- The surfaces to be bonded must be clean and free from grease.
- The raceways must be cleaned using a cleaning agent and well lubricated using a paste with a high MoS<sub>2</sub> content.
- It must be ensured that the lubricant ducts and lubricant holes are not blocked by adhesive.



# Mounting and dismounting

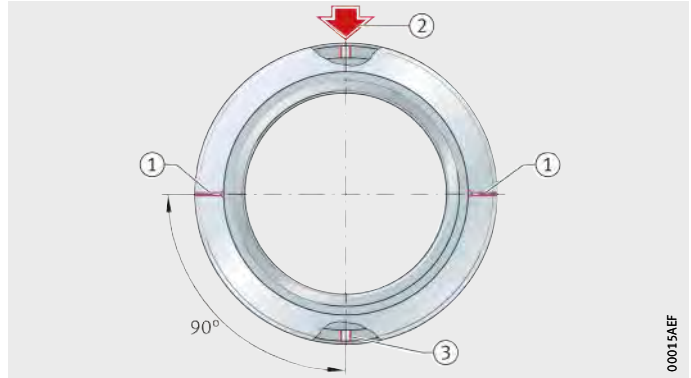
## Positioning of the joint

In radial spherical plain bearings with split outer rings (split 2×), the joints must be positioned at 90° to the main load direction, *Figure 15*.

The lubrication holes of bearings requiring maintenance are thus positioned directly in the load zone. This allows good lubricant distribution in the load zone area.

- ① Joint
- ② Main load direction
- ③ Lubrication hole

*Figure 15*  
Position of joint  
in main load direction



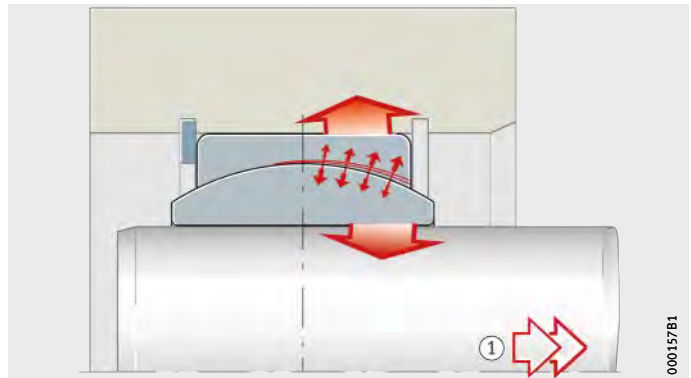
## Dismounting

Even if the load is applied to the ring to be dismantled in accordance with the specification, the frictional contact of the other ring due to the fit presents difficulties in dismounting.

Depending on the joint interference pressure, the inner ring will be constricted and the outer ring will be expanded, *Figure 16*. The extraction forces also increase with increasing joint interference pressure.

- ① Motion

*Figure 16*  
Constriction of the inner ring and  
expansion of the outer ring

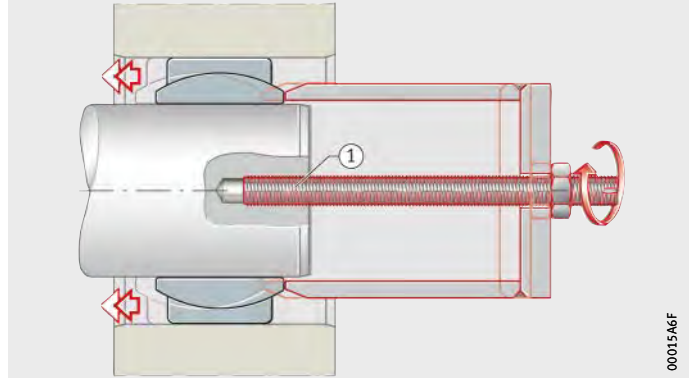


## Precautions for dismounting

If the following precautions are taken during design, this will make dismounting of the bearings easier:

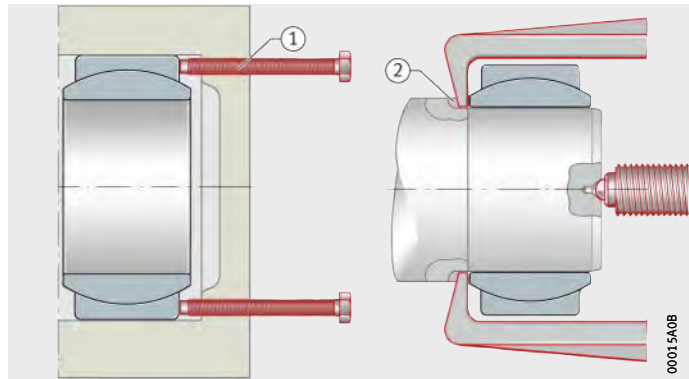
- a threaded hole for an extraction screw in the shaft, *Figure 17*
- threaded holes for extraction screws in the housing, *Figure 18*
- milled areas on the stud for the jaws of the removal device, *Figure 18*.

① Threaded hole

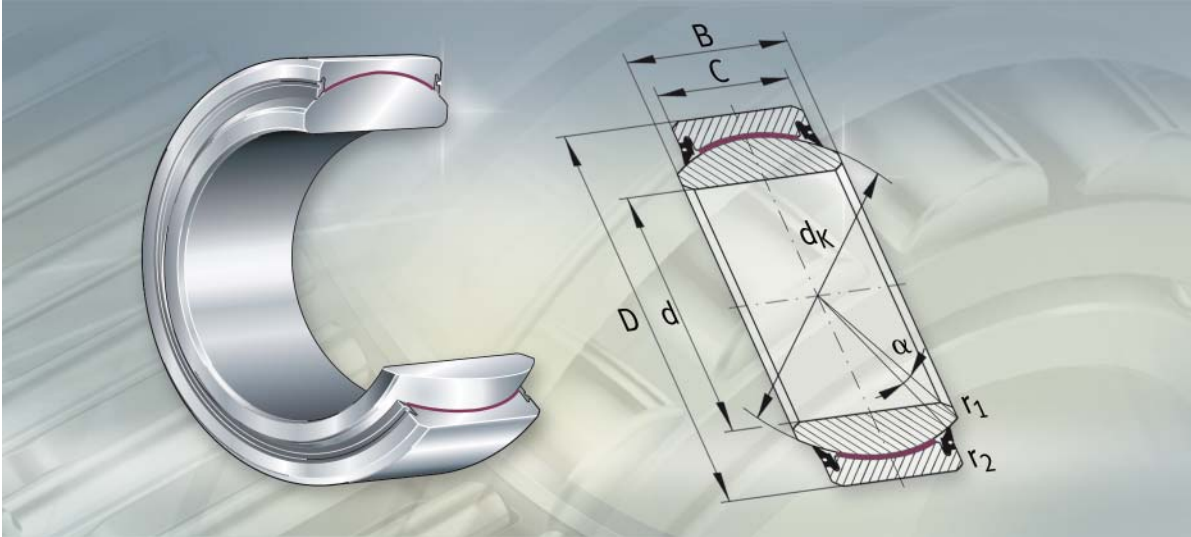


*Figure 17*  
Threaded holes in the shaft

① Threaded holes  
② Milled areas



*Figure 18*  
Threaded holes in the housing and  
milled areas for extractors



## Spherical plain bearings, maintenance-free

Radial spherical plain bearings

Axial spherical plain bearings

# Spherical plain bearings, maintenance-free

|                                     | Page  |
|-------------------------------------|---|
| <b>Product overview</b>             | Spherical plain bearings, maintenance-free ..... 876  |
| <b>Features</b>                     | Radial spherical plain bearings ..... 877   |
|                                     | X-life ..... 878  |
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|                                     | Axial spherical plain bearings, maintenance-free,<br>DIN ISO 12240-3 ..... 888                                      |

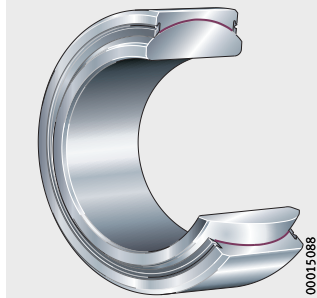


# Product overview Spherical plain bearings, maintenance-free

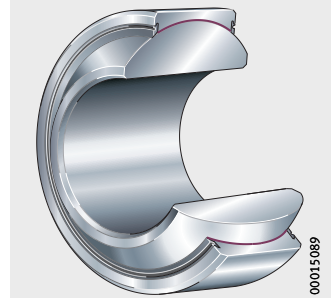
## Radial spherical plain bearings

With lip seals or open  
Hard chromium/ELGOGLIDE®-800

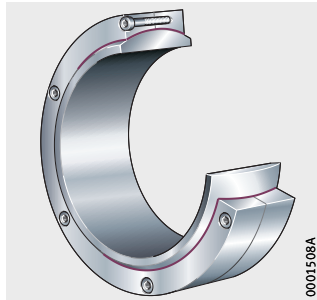
GE..-UK-2RS



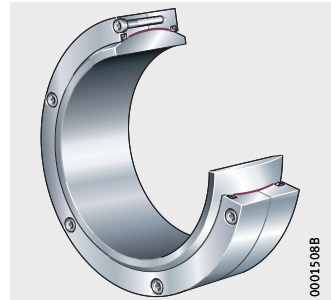
GE..-FW-2RS



GE..-DW



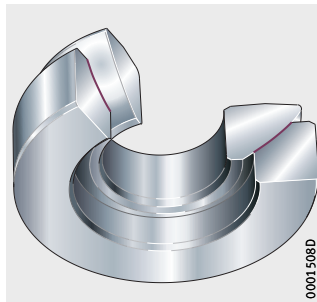
GE..-DW-2RS2



## Axial spherical plain bearings

Hard chromium/ELGOGLIDE®-800

GE..-AW



# Spherical plain bearings, maintenance-free

**Features** Maintenance-free large spherical plain bearings are available as radial and axial bearings.

The bearings are suitable for alternating and unilateral dynamic loads, ratio  $C_r/P$  ( $C_a/P$ ) see page 856.

Spherical plain bearings are maintenance-free for their operating life and must not be lubricated.

## Radial spherical plain bearings

Radial spherical plain bearings comprise inner rings and outer rings with a maintenance-free sliding layer. The inner ring has a cylindrical bore and a curved outer slideway. The outer ring has a cylindrical outside surface and a concave inner slideway. The standard sliding layer is ELGOGLIDE®-800. Technical data on ELGOGLIDE® sliding layers: see table.

Radial spherical plain bearings are used:

- where there are particular requirements on bearing life under maintenance-free operation
- under mainly radial loads
- where, for reasons of lubrication, bearings with a metallic sliding contact surface are not suitable, e.g. under unilateral load.

## Technical data on ELGOGLIDE® sliding layers

| Characteristics                                 |                   | ELGOGLIDE®  |                       |
|---|-------------------|---|-----------------------|
|   |                   | 800   | 600                   |
| Maximum permissible specific contact pressure p | Static            | 500 N/mm <sup>2</sup>   | 500 N/mm <sup>2</sup> |
|   | Dynamic, constant | 300 N/mm <sup>2</sup>   | 100 N/mm <sup>2</sup> |
|   | Dynamic, variable | 100 N/mm <sup>2</sup>   | 100 N/mm <sup>2</sup> |
| Minimum permissible specific contact pressure p | Dynamic           | 25 N/mm <sup>2</sup>  | 1 N/mm <sup>2</sup>   |
| Sliding velocity v                              |                   | 1 mm/s ≤ v ≤ 296 mm/s   |                       |
| p · v value                                     |                   | 1 N/mm <sup>2</sup> · mm/s ≤ p · v ≤ 2 200 N/mm <sup>2</sup> · mm/s |                       |
| Temperature t                                   |                   | -50 °C to +150 °C   |                       |
| Coefficient of friction μ                       |                   | 0,02 to 0,2   |                       |



At increased sliding velocities, good heat dissipation is necessary. For dimensioning, see Catalogue HG 1, Plain Bearings.

Available bore diameters and dimension series: see table.

## Bore diameters and dimension series

| Radial spherical plain bearing | Design to        | Dimension series | Bore diameter d mm |       |
|--------------------------------|------------------|------------------|--------------------|-------|
|                                |                  |                  | from               | incl. |
| GE..-JK-2RS                    | DIN ISO 12 240-1 | E                | 220                | 300   |
| GE..-FW-2RS                    | DIN ISO 12 240-1 | G                | 200                | 280   |

# Spherical plain bearings, maintenance-free

## X-life

The series GE..-DW and GE..-DW-2RS2 are of the X-life design. These bearings have even higher performance materials, lower coefficients of friction and lower running-in wear than comparable bearings.

The outer ring is radially split and held together axially by screws and dowel pins.

Available bore diameters and dimension series: see table.

### Bore diameters and dimension series

| Radial spherical plain bearing | Design to        | Dimension series | Bore diameter d mm |       |
|--------------------------------|------------------|------------------|--------------------|-------|
|                                |                  |                  | from               | to    |
| Series                         |                  |                  |                    |       |
| GE..-DW                        | DIN ISO 12 240-1 | C                | 320                | 1 000 |
| GE..-DW-2RS2                   |                  |                  |                    |       |

### Sealing

Sealed radial spherical plain bearings are protected against contamination and water spray by lip seals.

### Axial spherical plain bearings

Axial spherical plain bearings comprise shaft locating and housing locating washers. The shaft locating washer is supported in the ball socket-shaped sliding zone of the housing locating washer. The housing locating washer has an adhesive bonded layer of ELGOGLIDE®-800.

Axial spherical plain bearings are preferably used to support axial forces. They are suitable as support or base bearings and can be combined with radial spherical plain bearings of dimension series E to DIN ISO 12240-1, see page 880.

Axial large spherical plain bearings are also supplied in X-life quality. For the advantages of X-life, see section Radial spherical plain bearings, page 877.

Available bore diameters: see table.

### Bore diameter

| Axial spherical plain bearing | Design to        | Bore diameter d mm |     |
|-------------------------------|------------------|--------------------|-----|
|                               |                  | from               | to  |
| Series                        |                  |                    |     |
| GE..-AW                       | DIN ISO 12 240-3 | 220                | 360 |



## Operating temperature

The permissible operating temperature is dependent on the sliding contact surface and the sealing arrangement.



If the temperature exceeds the values according to the table, there will be a reduction in the operating life and the effect of the sealing arrangement.

## Temperature and rating life

| Spherical plain bearing              |                           |                        | Temperature<br>°C |      | Reduced<br>rating life<br>°C |
|--------------------------------------|---------------------------|------------------------|-------------------|------|------------------------------|
|                                      | Series                    | Sliding layer material | from              | to   |                              |
| Radial<br>spherical<br>plain bearing | GE...UK-2RS <sup>1)</sup> | ELGOGLIDE®-800         | -30               | +130 | <-20                         |
|                                      | GE...FW-2RS <sup>1)</sup> |                        | -30               | +130 |                              |
|                                      | GE...DW                   | ELGOGLIDE®-800-X-life  | -50               | +150 |                              |
|                                      | GE...DW-2RS <sup>2)</sup> |                        | -40               | +120 |                              |
| Axial spherical<br>plain bearing     | GE...AW                   | ELGOGLIDE®-800-X-life  | -50               | +150 |                              |

<sup>1)</sup> Open, for temperatures from -50 °C to +150 °C.

## Suffixes

Suffixes for available designs: see table.

## Available designs

| Suffix | Description   | Design  |
|--------|---|---|
| 2RS    | Lip seals on both sides   | Standard  |
| 2RS2   | Lip seals on both sides<br>with increased sealing action  |   |
| W1     | Inner and outer ring<br>made from corrosion-resistant steel   | Special design,<br>available by<br>agreement only |
| W3     | Inner ring made from corrosion-resistant steel  |   |
| W7     | Inner ring bore lined with ELGOGLIDE®-800,<br>bore diameter smaller than nominal dimension<br>( $d_{NEW} = d - 1,08$ )                                |   |
| W8     | Inner ring bore lined with ELGOGLIDE®-800<br>( $d_{NEW} = d$ )  |   |
| W11    | Maintenance-free ELGOGLIDE®-600 sliding layer,<br>for contact pressures between 1 N/mm <sup>2</sup> and<br>100 N/mm <sup>2</sup> and reduced friction |   |



# Spherical plain bearings, maintenance-free

## Design and safety guidelines



In predimensioning, the ratio  $C_r/P$  or  $C_a/P$  must be observed, see page 856. The permissible ratio is decisively dependent on the operating conditions and the required operating life.

The parts of different bearings are not interchangeable with each other.

## Support of radial forces

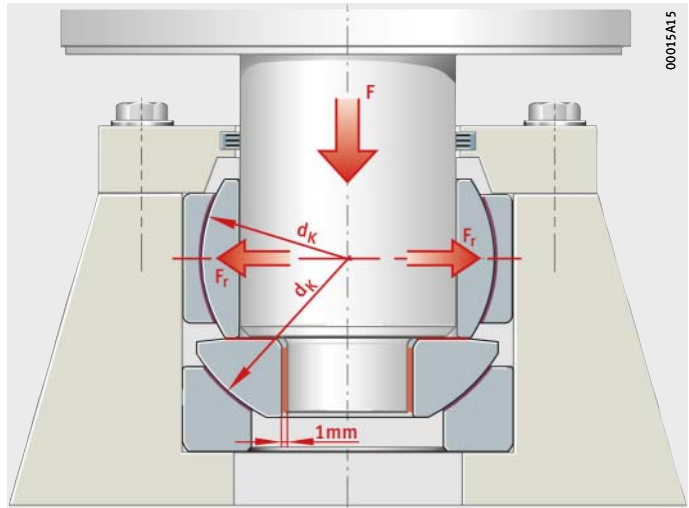
If axial spherical plain bearings are combined with radial spherical plain bearings of dimension series E to DIN ISO 12240-1 in order to support radial forces, the axial and radial load must be distributed over both bearings. The pin in the shaft locating washer must have a radial release of approx. 1 mm or the pin must only be in contact with the large end face of the shaft locating washer, *Figure 1*.



Axial spherical plain bearings must always be mounted in a closed housing. The diameter  $D$  of the axial bearing corresponds to the inside diameter of the housing.

$d_K$  = sphere diameter  
 $F_r$  = radial dynamic bearing load

*Figure 1*  
Combination of axial and radial spherical plain bearing



**Accuracy**

The main dimensions correspond to DIN ISO 12 240-1 or 3.  
The dimensional and geometrical accuracy of the inside and outside diameter corresponds to DIN ISO 12 240-1 or 3.  
Dimensional and tolerance data are arithmetic mean values.  
Dimensional checking is carried out in accordance with ISO 8 015.

**Spherical plain bearings  
with split outer ring**

The outside diameters are within the deviations given in the tables before surface treatment and splitting.

The outer rings become slightly out of round due to splitting.  
The roundness of the outer ring is restored once it is mounted in a housing bore produced in accordance with the specifications.

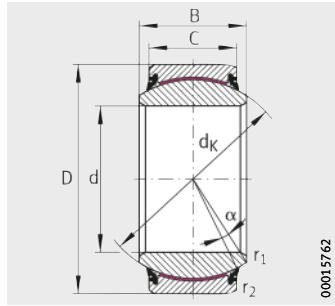


Measurements taken of the outside diameter of the unmounted bearing cannot be used as the original actual values for the outside diameter.

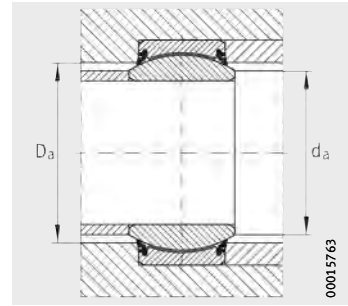


# Radial spherical plain bearings

Maintenance-free  
 DIN ISO 12240-1, dimension series E  
 Sealed



GE..-UK-2RS  
 Sliding contact surface  
 hard chromium/ELGOGLIDE®-800



Mounting dimensions

**Dimension table** - Dimensions in mm

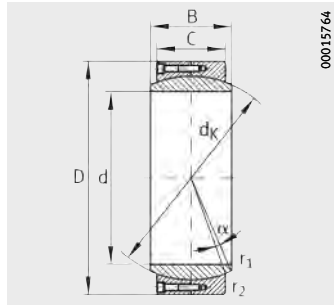
| Designation         | Mass<br>m<br>≈kg | Dimensions                  |                       |                      |                     |                |        |   |
|---------------------|------------------|-----------------------------|-----------------------|----------------------|---------------------|----------------|--------|---|
|                     |                  | d                           | D                     | B                    | C                   | d <sub>K</sub> | α<br>° | r <sub>1</sub> , r <sub>2</sub><br>min. |
| <b>GE220-UK-2RS</b> | 35,4             | <b>220<sub>-0,03</sub></b>  | 320 <sub>-0,04</sub>  | 135 <sub>-0,3</sub>  | 100 <sub>-0,8</sub> | 275            | 8      | 1,1                                     |
| <b>GE240-UK-2RS</b> | 39,4             | <b>240<sub>-0,03</sub></b>  | 340 <sub>-0,04</sub>  | 140 <sub>-0,3</sub>  | 100 <sub>-0,8</sub> | 300            | 8      | 1,1                                     |
| <b>GE260-UK-2RS</b> | 51,1             | <b>260<sub>-0,035</sub></b> | 370 <sub>-0,04</sub>  | 150 <sub>-0,35</sub> | 110 <sub>-0,8</sub> | 325            | 7      | 1,1                                     |
| <b>GE280-UK-2RS</b> | 64,5             | <b>280<sub>-0,035</sub></b> | 400 <sub>-0,04</sub>  | 155 <sub>-0,35</sub> | 120 <sub>-0,8</sub> | 350            | 6      | 1,1                                     |
| <b>GE300-UK-2RS</b> | 77,2             | <b>300<sub>-0,035</sub></b> | 430 <sub>-0,045</sub> | 165 <sub>-0,35</sub> | 120 <sub>-0,9</sub> | 375            | 7      | 1,1                                     |

| Mounting dimensions    |                        | Basic load ratings           |                                | Radial internal clearance |
|------------------------|------------------------|------------------------------|--------------------------------|---------------------------|
| d <sub>a</sub><br>max. | D <sub>a</sub><br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |                           |
| 239,5                  | 267                    | 6 600                        | 11 000                         | 0 – 0,11                  |
| 265,3                  | 295                    | 7 200                        | 12 000                         | 0 – 0,11                  |
| 288,3                  | 319                    | 8 550                        | 14 250                         | 0 – 0,125                 |
| 313,8                  | 342                    | 10 050                       | 16 750                         | 0 – 0,125                 |
| 336,7                  | 370                    | 10 800                       | 18 000                         | 0 – 0,125                 |

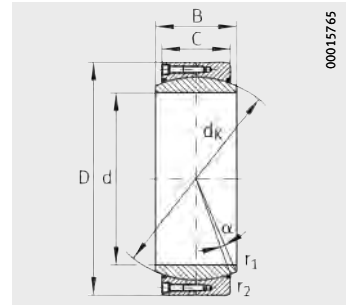


# Radial spherical plain bearings

Maintenance-free  
DIN ISO 12240-1, dimension series C  
Open or sealed



GE..-DW  
Sliding contact surface hard  
chromium/ELGOGLIDE®-800-X-life



GE..-DW-2RS2  
Sliding contact surface hard  
chromium/ELGOGLIDE®-800-X-life

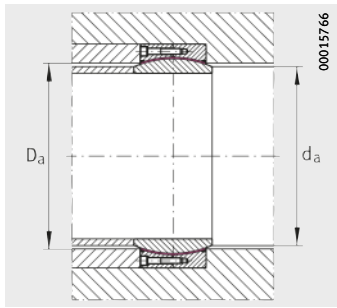
**Dimension table** - Dimensions in mm

| Designation   |        |                |        | Mass<br>m            |                   | Dimensions            |                         |                      |                     |
|---------------|--------|----------------|--------|----------------------|-------------------|-----------------------|-------------------------|----------------------|---------------------|
| Without seals | X-life | With seals     | X-life | Without seals<br>≈kg | With seals<br>≈kg | d                     | D                       | B                    | C                   |
| GE320-DW      | XL     | GE320-DW-2RS2  | XL     | 77,5                 | 76,6              | 320 <sub>-0,04</sub>  | 440 <sub>-0,045</sub>   | 160 <sub>-0,4</sub>  | 135 <sub>-0,9</sub> |
| GE340-DW      | XL     | GE340-DW-2RS2  | XL     | 82                   | 81,1              | 340 <sub>-0,04</sub>  | 460 <sub>-0,045</sub>   | 160 <sub>-0,4</sub>  | 135 <sub>-0,9</sub> |
| GE360-DW      | XL     | GE360-DW-2RS2  | XL     | 86,3                 | 85,3              | 360 <sub>-0,04</sub>  | 480 <sub>-0,045</sub>   | 160 <sub>-0,4</sub>  | 135 <sub>-0,9</sub> |
| GE380-DW      | XL     | GE380-DW-2RS2  | XL     | 126,9                | 125,7             | 380 <sub>-0,04</sub>  | 520 <sub>-0,05</sub>    | 190 <sub>-0,4</sub>  | 160 <sub>-1</sub>   |
| GE400-DW      | XL     | GE400-DW-2RS2  | XL     | 133,1                | 132               | 400 <sub>-0,04</sub>  | 540 <sub>-0,05</sub>    | 190 <sub>-0,4</sub>  | 160 <sub>-1</sub>   |
| GE420-DW      | XL     | GE420-DW-2RS2  | XL     | 139,2                | 138               | 420 <sub>-0,045</sub> | 560 <sub>-0,05</sub>    | 190 <sub>-0,45</sub> | 160 <sub>-1</sub>   |
| GE440-DW      | XL     | GE440-DW-2RS2  | XL     | 194,1                | 191,7             | 440 <sub>-0,045</sub> | 600 <sub>-0,05</sub>    | 218 <sub>-0,45</sub> | 185 <sub>-1</sub>   |
| GE460-DW      | XL     | GE460-DW-2RS2  | XL     | 202,2                | 199,8             | 460 <sub>-0,045</sub> | 620 <sub>-0,05</sub>    | 218 <sub>-0,45</sub> | 185 <sub>-1</sub>   |
| GE480-DW      | XL     | GE480-DW-2RS2  | XL     | 237                  | 234,4             | 480 <sub>-0,045</sub> | 650 <sub>-0,075</sub>   | 230 <sub>-0,45</sub> | 195 <sub>-1,1</sub> |
| GE500-DW      | XL     | GE500-DW-2RS2  | XL     | 246,1                | 243,5             | 500 <sub>-0,045</sub> | 670 <sub>-0,075</sub>   | 230 <sub>-0,45</sub> | 195 <sub>-1,1</sub> |
| GE530-DW      | XL     | GE530-DW-2RS2  | XL     | 291,2                | 288,4             | 530 <sub>-0,05</sub>  | 710 <sub>-0,075</sub>   | 243 <sub>-0,5</sub>  | 205 <sub>-1,1</sub> |
| GE560-DW      | XL     | GE560-DW-2RS2  | XL     | 342                  | 339,1             | 560 <sub>-0,05</sub>  | 750 <sub>-0,075</sub>   | 258 <sub>-0,5</sub>  | 215 <sub>-1,1</sub> |
| GE600-DW      | XL     | GE600-DW-2RS2  | XL     | 409,7                | 406,4             | 600 <sub>-0,05</sub>  | 800 <sub>-0,075</sub>   | 272 <sub>-0,5</sub>  | 230 <sub>-1,1</sub> |
| GE630-DW      | XL     | GE630-DW-2RS2  | XL     | 532,8                | 529,6             | 630 <sub>-0,05</sub>  | 850 <sub>-0,1</sub>     | 300 <sub>-0,5</sub>  | 260 <sub>-1,2</sub> |
| GE670-DW      | XL     | GE670-DW-2RS2  | XL     | 598                  | 594,5             | 670 <sub>-0,075</sub> | 900 <sub>-0,1</sub>     | 308 <sub>-0,75</sub> | 260 <sub>-1,2</sub> |
| GE710-DW      | XL     | GE710-DW-2RS2  | XL     | 697,7                | 693,7             | 710 <sub>-0,075</sub> | 950 <sub>-0,1</sub>     | 325 <sub>-0,75</sub> | 275 <sub>-1,2</sub> |
| GE750-DW      | XL     | GE750-DW-2RS2  | XL     | 785,4                | 781,1             | 750 <sub>-0,075</sub> | 1 000 <sub>-0,1</sub>   | 335 <sub>-0,75</sub> | 280 <sub>-1,2</sub> |
| GE800-DW      | XL     | GE800-DW-2RS2  | XL     | 926,8                | 922,3             | 800 <sub>-0,075</sub> | 1 060 <sub>-0,125</sub> | 355 <sub>-0,75</sub> | 300 <sub>-1,3</sub> |
| GE850-DW      | XL     | GE850-DW-2RS2  | XL     | 1 054,1              | 1 049,3           | 850 <sub>-0,1</sub>   | 1 120 <sub>-0,125</sub> | 365 <sub>-1</sub>    | 310 <sub>-1,3</sub> |
| GE900-DW      | XL     | GE900-DW-2RS2  | XL     | 1 190,2              | 1 185,1           | 900 <sub>-0,1</sub>   | 1 180 <sub>-0,125</sub> | 375 <sub>-1</sub>    | 320 <sub>-1,3</sub> |
| GE950-DW      | XL     | GE950-DW-2RS2  | XL     | 1 435,3              | 1 430             | 950 <sub>-0,1</sub>   | 1 250 <sub>-0,125</sub> | 400 <sub>-1</sub>    | 340 <sub>-1,3</sub> |
| GE1000-DW     | XL     | GE1000-DW-2RS2 | XL     | 1 757,3              | 1 752,1           | 1 000 <sub>-0,1</sub> | 1 320 <sub>-0,16</sub>  | 438 <sub>-1</sub>    | 370 <sub>-1,6</sub> |

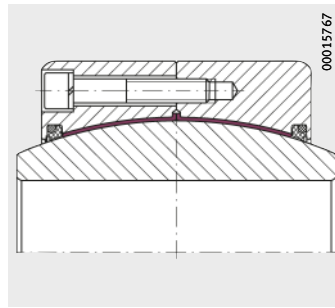
Attention!

The screw design is only valid for the basic load rating C.

If the load is greater, the outer ring halves must be supported by lateral clamping covers.



Mounting dimensions



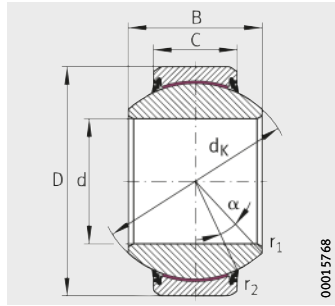
Detail

|       |          |       |       | Mounting dimensions |       | Basic load ratings |                   |               |                   | Radial internal clearance |
|-------|----------|-------|-------|---------------------|-------|--------------------|-------------------|---------------|-------------------|---------------------------|
|       |          |       |       |                     |       | Without seals      |                   | With seals    |                   |                           |
| $d_K$ | $\alpha$ | $r_1$ | $r_2$ | $d_a$               | $D_a$ | dyn.<br>$C_r$      | stat.<br>$C_{Or}$ | dyn.<br>$C_r$ | stat.<br>$C_{Or}$ |                           |
|       | °        | min.  | min.  | max.                | min.  | kN                 | kN                | kN            | kN                |                           |
| 380   | 4        | 1,1   | 3     | 344,6               | 361   | 15 390             | 25 650            | 12 920        | 21 540            | 0 – 0,125                 |
| 400   | 3,8      | 1,1   | 3     | 366,6               | 382   | 16 200             | 27 000            | 13 600        | 22 680            | 0 – 0,125                 |
| 420   | 3,6      | 1,1   | 3     | 388,3               | 403   | 17 010             | 28 350            | 14 280        | 23 810            | 0 – 0,135                 |
| 450   | 4,1      | 1,5   | 4     | 407,9               | 426   | 21 600             | 36 000            | 18 680        | 31 140            | 0 – 0,135                 |
| 470   | 3,9      | 1,5   | 4     | 429,8               | 447   | 22 560             | 37 600            | 19 510        | 32 520            | 0 – 0,135                 |
| 490   | 3,7      | 1,5   | 4     | 451,6               | 469   | 23 520             | 39 200            | 20 340        | 33 900            | 0 – 0,135                 |
| 520   | 3,9      | 1,5   | 4     | 472                 | 491   | 28 860             | 48 100            | 24 490        | 40 820            | 0 – 0,145                 |
| 540   | 3,7      | 1,5   | 4     | 494                 | 513   | 29 970             | 49 950            | 25 430        | 42 390            | 0 – 0,145                 |
| 565   | 3,8      | 2     | 5     | 516                 | 536   | 33 050             | 55 080            | 28 300        | 47 170            | 0 – 0,145                 |
| 585   | 3,6      | 2     | 5     | 537,8               | 557   | 34 220             | 57 030            | 29 300        | 48 840            | 0 – 0,145                 |
| 620   | 3,7      | 2     | 5     | 570,3               | 591   | 38 130             | 63 550            | 32 920        | 54 870            | 0 – 0,145                 |
| 655   | 4        | 2     | 5     | 602                 | 624   | 42 240             | 70 410            | 36 740        | 61 240            | 0 – 0,16                  |
| 700   | 3,6      | 2     | 5     | 644,9               | 667   | 48 300             | 80 500            | 42 420        | 70 700            | 0 – 0,16                  |
| 740   | 3,3      | 3     | 6     | 676,4               | 698   | 57 720             | 96 200            | 51 500        | 85 840            | 0 – 0,16                  |
| 785   | 3,7      | 3     | 6     | 722                 | 746   | 61 230             | 102 050           | 54 630        | 91 060            | 0 – 0,16                  |
| 830   | 3,7      | 3     | 6     | 763,7               | 789   | 68 470             | 114 120           | 60 850        | 101 420           | 0 – 0,17                  |
| 875   | 3,8      | 3     | 6     | 808,3               | 834   | 73 500             | 122 500           | 65 460        | 109 110           | 0 – 0,17                  |
| 930   | 3,6      | 3     | 6     | 859,5               | 886   | 83 700             | 139 500           | 75 160        | 125 270           | 0 – 0,17                  |
| 985   | 3,4      | 3     | 6     | 914,8               | 940   | 91 600             | 152 670           | 82 560        | 137 600           | 0 – 0,17                  |
| 1 040 | 3,2      | 3     | 6     | 970                 | 995   | 99 840             | 166 400           | 90 290        | 150 480           | 0 – 0,195                 |
| 1 100 | 3,3      | 4     | 7,5   | 1 024,6             | 1 052 | 112 200            | 187 000           | 102 100       | 170 170           | 0 – 0,195                 |
| 1 160 | 3,5      | 4     | 7,5   | 1 074,1             | 1 105 | 128 760            | 214 600           | 118 110       | 196 850           | 0 – 0,195                 |

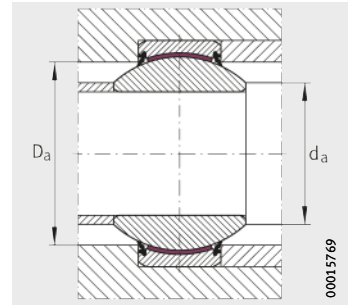


# Radial spherical plain bearings

Maintenance-free  
 DIN ISO 12240-1,  
 dimension series G  
 Sealed



GE..-FW-2RS  
 Sliding contact surface  
 hard chromium/ELGOGLIDE®-800



Mounting dimensions

**Dimension table** - Dimensions in mm

| Designation         | Mass<br>m<br>≈kg | Dimensions                  |                       |                      |                     |       |               |                    |
|---------------------|------------------|-----------------------------|-----------------------|----------------------|---------------------|-------|---------------|--------------------|
|                     |                  | d                           | D                     | B                    | C                   | $d_k$ | $\alpha$<br>° | $r_1, r_2$<br>min. |
| <b>GE200-FW-2RS</b> | 44,8             | <b>200<sub>-0,03</sub></b>  | 320 <sub>-0,04</sub>  | 165 <sub>-0,3</sub>  | 100 <sub>-0,8</sub> | 275   | 15            | 1,1                |
| <b>GE220-FW-2RS</b> | 50,9             | <b>220<sub>-0,03</sub></b>  | 340 <sub>-0,04</sub>  | 175 <sub>-0,3</sub>  | 100 <sub>-0,8</sub> | 300   | 16            | 1,1                |
| <b>GE240-FW-2RS</b> | 65               | <b>240<sub>-0,03</sub></b>  | 370 <sub>-0,04</sub>  | 190 <sub>-0,35</sub> | 110 <sub>-0,8</sub> | 325   | 15            | 1,1                |
| <b>GE260-FW-2RS</b> | 81,7             | <b>260<sub>-0,035</sub></b> | 400 <sub>-0,04</sub>  | 205 <sub>-0,35</sub> | 120 <sub>-0,8</sub> | 350   | 15            | 1,1                |
| <b>GE280-FW-2RS</b> | 96,6             | <b>280<sub>-0,035</sub></b> | 430 <sub>-0,045</sub> | 210 <sub>-0,35</sub> | 120 <sub>-0,9</sub> | 375   | 15            | 1,1                |

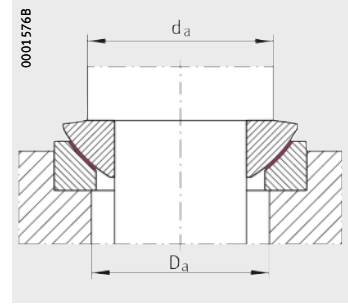
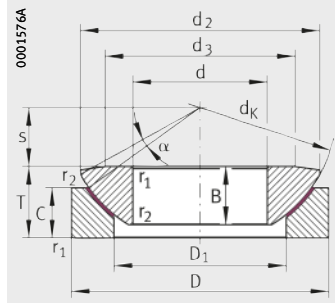


| Mounting dimensions    |                        | Basic load ratings           |                                | Radial internal clearance |
|------------------------|------------------------|------------------------------|--------------------------------|---------------------------|
| d <sub>a</sub><br>max. | D <sub>a</sub><br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |                           |
| 220                    | 267                    | 6 600                        | 11 000                         | 0 – 0,11                  |
| 243,6                  | 295                    | 7 200                        | 12 000                         | 0 – 0,11                  |
| 263,6                  | 319                    | 8 550                        | 14 250                         | 0 – 0,125                 |
| 283,6                  | 342                    | 10 050                       | 16 750                         | 0 – 0,125                 |
| 310,6                  | 370                    | 10 800                       | 18 000                         | 0 – 0,125                 |



# Axial spherical plain bearings

Maintenance-free  
DIN ISO 12240-3



GE..-AW  
Sliding contact surface hard  
chromium/ELGOGLIDE®-800-X-life

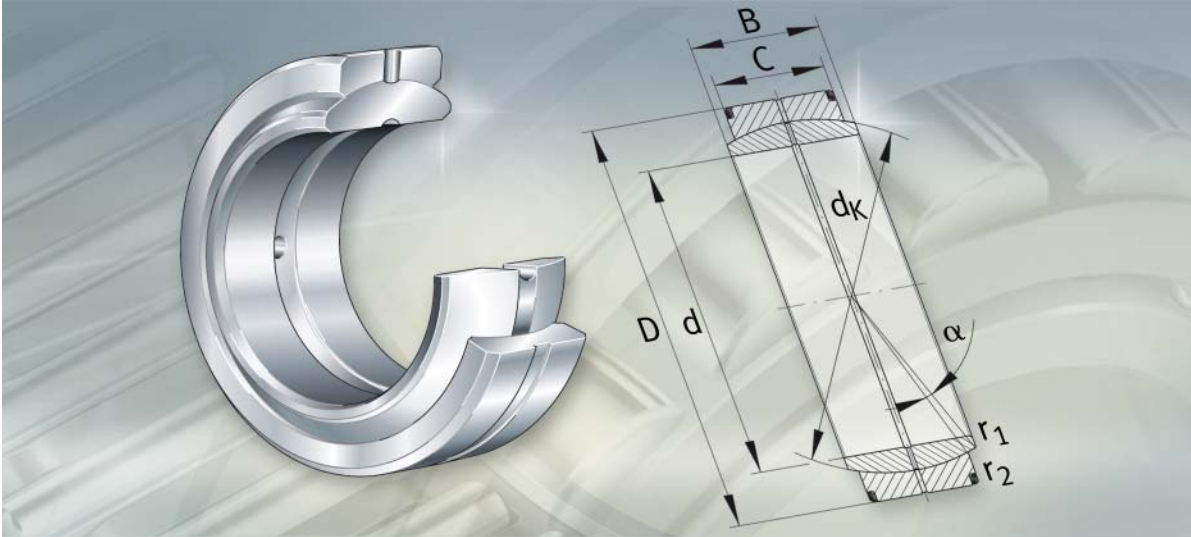
Mounting dimensions

Dimension table - Dimensions in mm

| Designation | X-life | Mass<br>m<br>≈ kg | Dimensions            |                       |                     |     |                |                |                |
|-------------|--------|-------------------|-----------------------|-----------------------|---------------------|-----|----------------|----------------|----------------|
|             |        |                   | d                     | D                     | T                   | dk  | d <sub>2</sub> | d <sub>3</sub> | D <sub>1</sub> |
| GE220-AW    | XL     | 45,6              | 220 <sub>-0,03</sub>  | 370 <sub>-0,04</sub>  | 97 <sub>-0,6</sub>  | 388 | 350            | 289            | 265            |
| GE240-AW    | XL     | 57                | 240 <sub>-0,03</sub>  | 400 <sub>-0,04</sub>  | 103 <sub>-0,6</sub> | 420 | 382            | 314            | 294            |
| GE260-AW    | XL     | 71,3              | 260 <sub>-0,035</sub> | 430 <sub>-0,045</sub> | 115 <sub>-0,7</sub> | 449 | 409            | 336            | 317            |
| GE280-AW    | XL     | 84,1              | 280 <sub>-0,035</sub> | 460 <sub>-0,045</sub> | 110 <sub>-0,7</sub> | 480 | 445            | 366            | 337            |
| GE300-AW    | XL     | 88,6              | 300 <sub>-0,035</sub> | 480 <sub>-0,045</sub> | 110 <sub>-0,7</sub> | 490 | 460            | 388            | 356            |
| GE320-AW    | XL     | 111,5             | 320 <sub>-0,04</sub>  | 520 <sub>-0,05</sub>  | 116 <sub>-0,8</sub> | 540 | 500            | 405            | 380            |
| GE340-AW    | XL     | 117               | 340 <sub>-0,04</sub>  | 540 <sub>-0,05</sub>  | 116 <sub>-0,8</sub> | 550 | 510            | 432            | 380            |
| GE360-AW    | XL     | 132,3             | 360 <sub>-0,04</sub>  | 560 <sub>-0,05</sub>  | 125 <sub>-0,8</sub> | 575 | 535            | 452            | 400            |

| B                   | C                  | s    | $\alpha$<br>° | $r_1$<br>min. | $r_2$<br>min. | Mounting dimensions |               | Basic load ratings  |                         |
|---------------------|--------------------|------|---------------|---------------|---------------|---------------------|---------------|---------------------|-------------------------|
|                     |                    |      |               |               |               | $d_a$<br>max.       | $D_a$<br>min. | dyn.<br>$C_a$<br>kN | stat.<br>$C_{0a}$<br>kN |
| 82 <sub>-0,6</sub>  | 67 <sub>-0,6</sub> | 75   | 7             | 1,5           | 0,6           | 289                 | 279           | 8 530               | 14 220                  |
| 87 <sub>-0,6</sub>  | 73 <sub>-0,6</sub> | 77,5 | 6             | 1,5           | 0,6           | 314                 | 309           | 10 300              | 17 170                  |
| 95 <sub>-0,7</sub>  | 80 <sub>-0,7</sub> | 82,5 | 7             | 1,5           | 0,6           | 336                 | 332           | 10 810              | 18 010                  |
| 100 <sub>-0,7</sub> | 85 <sub>-0,7</sub> | 80   | 4             | 3             | 1             | 366                 | 355           | 17 130              | 28 560                  |
| 100 <sub>-0,7</sub> | 90 <sub>-0,7</sub> | 80   | 3,5           | 3             | 1             | 388                 | 375           | 17 280              | 28 800                  |
| 105 <sub>-0,8</sub> | 91 <sub>-0,8</sub> | 95   | 4             | 4             | 1,1           | 405                 | 402           | 21 110              | 35 180                  |
| 105 <sub>-0,8</sub> | 91 <sub>-0,8</sub> | 95   | 4             | 4             | 1,1           | 432                 | 402           | 23 670              | 39 460                  |
| 115 <sub>-0,8</sub> | 95 <sub>-0,8</sub> | 95   | 4             | 4             | 1,1           | 452                 | 422           | 25 470              | 42 460                  |





## Spherical plain bearings, requiring maintenance

Radial spherical plain bearings

# Spherical plain bearings, requiring maintenance

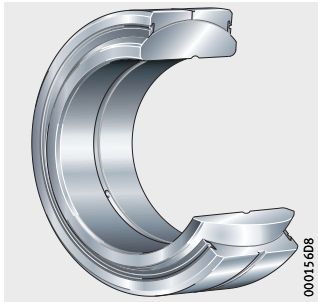
|                                     | Page   |
|-------------------------------------|--|
| <b>Product overview</b>             | Spherical plain bearings, requiring maintenance..... 892   |
| <b>Features</b>                     | Radial spherical plain bearings ..... 893  |
|                                     | Sealing..... 893   |
|                                     | Lubrication ..... 893  |
|                                     | Operating temperature ..... 894  |
|                                     | Suffixes ..... 894   |
| <b>Design and safety guidelines</b> | ..... 895  |
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| <b>Dimension tables</b>             | Radial spherical plain bearings, requiring maintenance,<br>DIN ISO 12240-1, dimension series E, sealed..... 896  |
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|                                     | Radial spherical plain bearings, requiring maintenance,<br>DIN ISO 12240-1, dimension series G, sealed ..... 900 |



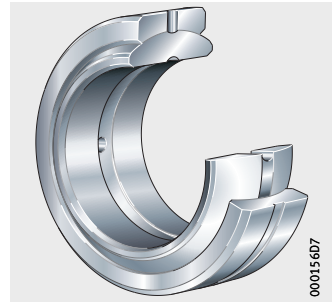
# Product overview Spherical plain bearings, requiring maintenance

**Radial spherical plain bearings**  
With lip seals or open  
Steel/steel

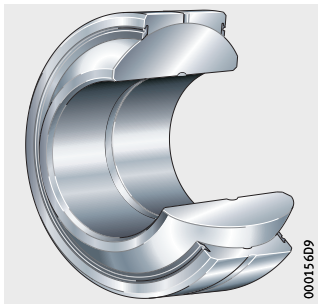
GE..-DO-2RS



GE..-DO



GE..-FO-2RS



# Spherical plain bearings, requiring maintenance

**Features** Large spherical plain bearings requiring maintenance are available as radial bearings.

The bearings are suitable for alternating and unilateral dynamic loads, ratio  $C_r/P$  see page 856.

## Radial spherical plain bearings

The bearings comprise inner and outer rings with a steel/steel sliding contact surface. Technical data on the sliding contact surface: see table. The inner ring has a cylindrical bore and a curved outer slideway. The outer ring has a cylindrical outside surface and a concave inner slideway.

They can support radial forces, transmit motion and loads with low moment levels and thus keep bending stresses away from the construction elements. The bearings are particularly suitable for alternating loads with impact and shock type stresses and support axial loads in both directions.

## Technical data

| Characteristics                        | Load  |   |
|--|---|---|
| Specific load parameters $K$ and $K_o$ | Dynamic, alternating  | 100 N/mm <sup>2</sup>                             |
|  | Dynamic, unilateral   | 60 N/mm <sup>2</sup>                              |
|  | Static  | 500 N/mm <sup>2</sup>                             |
| Contact pressure $p$                   | Alternating   | $1 \text{ N/mm}^2 \leq p \leq 100 \text{ N/mm}^2$ |
|  | Unilateral  | $1 \text{ N/mm}^2 \leq p \leq 60 \text{ N/mm}^2$  |
| Sliding velocity $v$                   | $1 \text{ mm/s} \leq v \leq 100 \text{ mm/s}$   |   |
| $p \cdot v$ value                      | $1 \text{ N/mm}^2 \cdot \text{mm/s} \leq p \cdot v \leq 400 \text{ N/mm}^2 \cdot \text{mm/s}$ |   |
| Ratio $C/P$                            | Alternating   | 3 to 1  |
|  | Unilateral  | 4 to 1,7  |
| Friction factor $\mu$                  | $0,08 \leq \mu \leq 0,22$   |   |



Available bore diameters and dimension series: see table.

## Bore diameters and dimension series

| Radial spherical plain bearing | Design to        | Dimension series | Bore diameter $d$ mm |       |
|--------------------------------|------------------|------------------|----------------------|-------|
|                                |                  |                  | from                 | to    |
| GE..-DO-2RS                    | DIN ISO 12 240-1 | E                | 220                  | 300   |
| GE..-DO                        | DIN ISO 12 240-1 | C                | 320                  | 1 000 |
| GE..-FO-2RS                    | DIN ISO 12 240-1 | G                | 200                  | 280   |

**Sealing** Sealed radial spherical plain bearings are protected against contamination and water spray by lip seals.

**Lubrication** The bearings are lubricated via the outer and inner ring.



The relubrication intervals must be observed.

# Spherical plain bearings, requiring maintenance

## Operating temperature

The permissible operating temperature is dependent on the sliding contact surface and the sealing arrangement.



If the temperature exceeds the values according to the table, there will be a reduction in the operating life and the effect of the sealing arrangement.

## Temperature and rating life

| Radial spherical plain bearing<br>Series | Temperature °C |      | Reduced rating life °C<br>from |
|--|----------------|------|--------------------------------|
|  | from           | to   |                                |
| GE..DO                                   | -60            | +200 | +150                           |
| GE..DO-2RS <sup>1)</sup>                 | -30            | +130 | -                              |
| GE..FO-2RS <sup>1)</sup>                 | -30            | +130 | -                              |

<sup>1)</sup> Open, for temperatures from -60 °C to +200 °C.

## Suffixes

Suffixes for available designs: see table.

## Available designs

| Suffix | Description             | Design   |
|--------|-------------------------|----------|
| 2RS    | Lip seals on both sides | Standard |



## Design and safety guidelines



In predimensioning, the ratio  $C_r/P$  must be observed, see page 856. The permissible ratio is decisively dependent on the operating conditions and the required operating life.

The parts of different bearings are not interchangeable with each other.

For the support of radial forces, see page 880.

### Accuracy

The main dimensions correspond to DIN ISO 12 240-1.

The dimensional and geometrical accuracy of the inside and outside diameter corresponds to DIN ISO 12 240-1.

Dimensional and tolerance data are arithmetic mean values.

Dimensional checking is carried out in accordance with ISO 8 015.

## Spherical plain bearings with split outer ring

The outside diameters are within the deviations given in the tables before surface treatment and splitting.

The outer rings become slightly out of round due to splitting. The roundness of the outer ring is restored once it is mounted in a housing bore produced in accordance with the specifications.

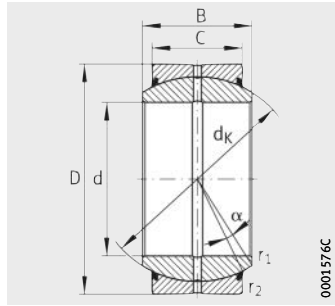


Measurements taken of the outside diameter of the unmounted bearing cannot be used as the original actual values for the outside diameter.

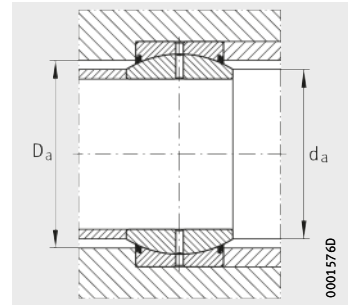


# Radial spherical plain bearings

Requiring maintenance  
 DIN ISO 12240-1, dimension series E  
 Sealed



GE..-DO-2RS  
 Sliding contact surface  
 steel/steel



Mounting dimensions

**Dimension table** - Dimensions in mm

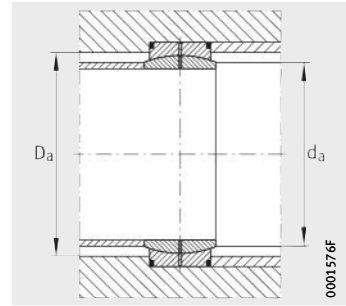
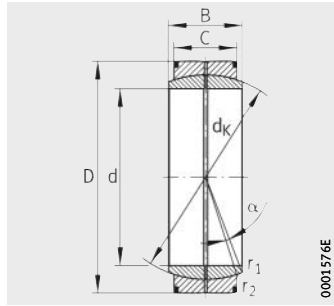
| Designation         | Mass<br>m<br>≈kg | Dimensions                  |                       |                      |                     |       |               |                    |
|---------------------|------------------|-----------------------------|-----------------------|----------------------|---------------------|-------|---------------|--------------------|
|                     |                  | d                           | D                     | B                    | C                   | $d_K$ | $\alpha$<br>° | $r_1, r_2$<br>min. |
| <b>GE220-DO-2RS</b> | 35,5             | <b>220<sub>-0,03</sub></b>  | 320 <sub>-0,04</sub>  | 135 <sub>-0,3</sub>  | 100 <sub>-0,8</sub> | 275   | 8             | 1,1                |
| <b>GE240-DO-2RS</b> | 39,5             | <b>240<sub>-0,03</sub></b>  | 340 <sub>-0,04</sub>  | 140 <sub>-0,3</sub>  | 100 <sub>-0,8</sub> | 300   | 8             | 1,1                |
| <b>GE260-DO-2RS</b> | 51,2             | <b>260<sub>-0,035</sub></b> | 370 <sub>-0,04</sub>  | 150 <sub>-0,35</sub> | 110 <sub>-0,8</sub> | 325   | 7             | 1,1                |
| <b>GE280-DO-2RS</b> | 64,8             | <b>280<sub>-0,035</sub></b> | 400 <sub>-0,04</sub>  | 155 <sub>-0,35</sub> | 120 <sub>-0,8</sub> | 350   | 6             | 1,1                |
| <b>GE300-DO-2RS</b> | 77,5             | <b>300<sub>-0,035</sub></b> | 430 <sub>-0,045</sub> | 165 <sub>-0,35</sub> | 120 <sub>-0,9</sub> | 375   | 7             | 1,1                |

| Mounting dimensions    |                        | Basic load ratings           |                                | Radial internal clearance |
|------------------------|------------------------|------------------------------|--------------------------------|---------------------------|
| d <sub>a</sub><br>max. | D <sub>a</sub><br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | CN                        |
| 239,5                  | 267                    | 2 320                        | 11 600                         | 0,11 – 0,214              |
| 265,3                  | 295                    | 2 550                        | 12 700                         | 0,11 – 0,214              |
| 288,3                  | 319                    | 3 050                        | 15 300                         | 0,125 – 0,239             |
| 313,8                  | 342                    | 3 550                        | 18 000                         | 0,125 – 0,239             |
| 336,7                  | 370                    | 3 800                        | 19 000                         | 0,125 – 0,239             |



# Radial spherical plain bearings

Requiring maintenance  
 DIN ISO 12240-1, dimension series C  
 Open



GE..-DO  
 Sliding contact surface  
 steel/steel

Mounting dimensions

Dimension table - Dimensions in mm

| Designation | Mass<br>m<br>≈ kg | Dimensions            |                         |                      |                     |                |        |
|-------------|-------------------|-----------------------|-------------------------|----------------------|---------------------|----------------|--------|
|             |                   | d                     | D                       | B                    | C                   | d <sub>k</sub> | α<br>° |
| GE320-DO    | 77,2              | 320 <sub>-0,04</sub>  | 440 <sub>-0,045</sub>   | 160 <sub>-0,4</sub>  | 135 <sub>-0,9</sub> | 380            | 4      |
| GE340-DO    | 81,4              | 340 <sub>-0,04</sub>  | 460 <sub>-0,045</sub>   | 160 <sub>-0,4</sub>  | 135 <sub>-0,9</sub> | 400            | 3,8    |
| GE360-DO    | 85,8              | 360 <sub>-0,04</sub>  | 480 <sub>-0,045</sub>   | 160 <sub>-0,4</sub>  | 135 <sub>-0,9</sub> | 420            | 3,6    |
| GE380-DO    | 126,7             | 380 <sub>-0,04</sub>  | 520 <sub>-0,05</sub>    | 190 <sub>-0,4</sub>  | 160 <sub>-1</sub>   | 450            | 4,1    |
| GE400-DO    | 132,9             | 400 <sub>-0,04</sub>  | 540 <sub>-0,05</sub>    | 190 <sub>-0,4</sub>  | 160 <sub>-1</sub>   | 470            | 3,9    |
| GE420-DO    | 138,6             | 420 <sub>-0,045</sub> | 560 <sub>-0,05</sub>    | 190 <sub>-0,45</sub> | 160 <sub>-1</sub>   | 490            | 3,7    |
| GE440-DO    | 193               | 440 <sub>-0,045</sub> | 600 <sub>-0,05</sub>    | 218 <sub>-0,45</sub> | 185 <sub>-1</sub>   | 520            | 3,9    |
| GE460-DO    | 200,9             | 460 <sub>-0,045</sub> | 620 <sub>-0,05</sub>    | 218 <sub>-0,45</sub> | 185 <sub>-1</sub>   | 540            | 3,7    |
| GE480-DO    | 235,6             | 480 <sub>-0,045</sub> | 650 <sub>-0,075</sub>   | 230 <sub>-0,45</sub> | 195 <sub>-1,1</sub> | 565            | 3,8    |
| GE500-DO    | 244,3             | 500 <sub>-0,045</sub> | 670 <sub>-0,075</sub>   | 230 <sub>-0,45</sub> | 195 <sub>-1,1</sub> | 585            | 3,6    |
| GE530-DO    | 289,4             | 530 <sub>-0,05</sub>  | 710 <sub>-0,075</sub>   | 243 <sub>-0,5</sub>  | 205 <sub>-1,1</sub> | 620            | 3,7    |
| GE560-DO    | 339,8             | 560 <sub>-0,05</sub>  | 750 <sub>-0,075</sub>   | 258 <sub>-0,5</sub>  | 215 <sub>-1,1</sub> | 655            | 4      |
| GE600-DO    | 407,2             | 600 <sub>-0,05</sub>  | 800 <sub>-0,075</sub>   | 272 <sub>-0,5</sub>  | 230 <sub>-1,1</sub> | 700            | 3,6    |
| GE630-DO    | 530,2             | 630 <sub>-0,05</sub>  | 850 <sub>-0,1</sub>     | 300 <sub>-0,5</sub>  | 260 <sub>-1,2</sub> | 740            | 3,3    |
| GE670-DO    | 594,4             | 670 <sub>-0,075</sub> | 900 <sub>-0,1</sub>     | 308 <sub>-0,75</sub> | 260 <sub>-1,2</sub> | 785            | 3,7    |
| GE710-DO    | 693               | 710 <sub>-0,075</sub> | 950 <sub>-0,1</sub>     | 325 <sub>-0,75</sub> | 275 <sub>-1,2</sub> | 830            | 3,7    |
| GE750-DO    | 779,2             | 750 <sub>-0,075</sub> | 1 000 <sub>-0,1</sub>   | 335 <sub>-0,75</sub> | 280 <sub>-1,2</sub> | 875            | 3,8    |
| GE800-DO    | 920               | 800 <sub>-0,075</sub> | 1 060 <sub>-0,125</sub> | 355 <sub>-0,75</sub> | 300 <sub>-1,3</sub> | 930            | 3,6    |
| GE850-DO    | 1 047             | 850 <sub>-0,1</sub>   | 1 120 <sub>-0,125</sub> | 365 <sub>-1</sub>    | 310 <sub>-1,3</sub> | 985            | 3,4    |
| GE900-DO    | 1 184,2           | 900 <sub>-0,1</sub>   | 1 180 <sub>-0,125</sub> | 375 <sub>-1</sub>    | 320 <sub>-1,3</sub> | 1 040          | 3,2    |
| GE950-DO    | 1 421,8           | 950 <sub>-0,1</sub>   | 1 250 <sub>-0,125</sub> | 400 <sub>-1</sub>    | 340 <sub>-1,3</sub> | 1 100          | 3,3    |
| GE1000-DO   | 1 743,6           | 1 000 <sub>-0,1</sub> | 1 320 <sub>-0,16</sub>  | 438 <sub>-1</sub>    | 370 <sub>-1,6</sub> | 1 160          | 3,5    |

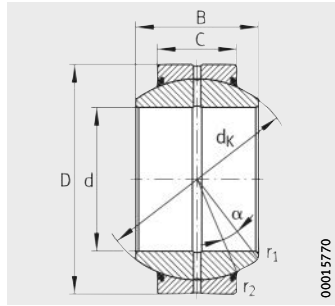
1) D<sub>a max</sub> = D<sub>a min</sub> + 20 mm

|                        |                        | Mounting dimensions    |                                      | Basic load ratings           |                                | Radial internal clearance<br>CN |
|------------------------|------------------------|------------------------|--------------------------------------|------------------------------|--------------------------------|---------------------------------|
| r <sub>1</sub><br>min. | r <sub>2</sub><br>min. | d <sub>a</sub><br>max. | D <sub>a</sub> <sup>1)</sup><br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN |                                 |
| 1,1                    | 3                      | 344,6                  | 361                                  | 4 400                        | 22 000                         | 0,125 – 0,239                   |
| 1,1                    | 3                      | 366,6                  | 382                                  | 4 650                        | 23 200                         | 0,125 – 0,239                   |
| 1,1                    | 3                      | 388,3                  | 403                                  | 4 800                        | 24 000                         | 0,135 – 0,261                   |
| 1,5                    | 4                      | 407,9                  | 426                                  | 6 300                        | 31 500                         | 0,135 – 0,261                   |
| 1,5                    | 4                      | 429,8                  | 447                                  | 6 550                        | 32 500                         | 0,135 – 0,261                   |
| 1,5                    | 4                      | 451,6                  | 469                                  | 6 800                        | 34 500                         | 0,135 – 0,261                   |
| 1,5                    | 4                      | 472                    | 491                                  | 8 650                        | 42 300                         | 0,145 – 0,285                   |
| 1,5                    | 4                      | 494                    | 513                                  | 9 000                        | 45 000                         | 0,145 – 0,285                   |
| 2                      | 5                      | 516                    | 536                                  | 9 800                        | 49 000                         | 0,145 – 0,285                   |
| 2                      | 5                      | 537,8                  | 557                                  | 10 200                       | 51 000                         | 0,145 – 0,285                   |
| 2                      | 5                      | 570,3                  | 591                                  | 11 400                       | 57 000                         | 0,145 – 0,285                   |
| 2                      | 5                      | 602                    | 624                                  | 12 700                       | 64 000                         | 0,16 – 0,32                     |
| 2                      | 5                      | 644,9                  | 667                                  | 14 600                       | 73 500                         | 0,16 – 0,32                     |
| 3                      | 6                      | 676,4                  | 698                                  | 17 600                       | 88 000                         | 0,16 – 0,32                     |
| 3                      | 6                      | 722                    | 746                                  | 19 000                       | 95 000                         | 0,16 – 0,32                     |
| 3                      | 6                      | 763,7                  | 789                                  | 21 200                       | 106 000                        | 0,17 – 0,35                     |
| 3                      | 6                      | 808,3                  | 834                                  | 22 800                       | 114 000                        | 0,17 – 0,35                     |
| 3                      | 6                      | 859,5                  | 886                                  | 26 000                       | 129 000                        | 0,17 – 0,35                     |
| 3                      | 6                      | 914,8                  | 940                                  | 28 500                       | 143 000                        | 0,17 – 0,35                     |
| 3                      | 6                      | 970                    | 995                                  | 31 000                       | 156 000                        | 0,195 – 0,405                   |
| 4                      | 7,5                    | 1 024,6                | 1 052                                | 35 500                       | 176 000                        | 0,195 – 0,405                   |
| 4                      | 7,5                    | 1 074,1                | 1 105                                | 40 500                       | 204 000                        | 0,195 – 0,405                   |

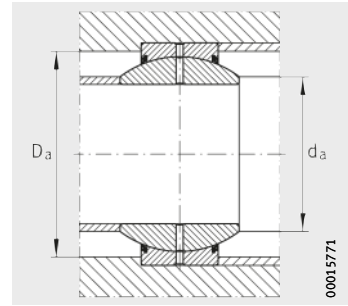


# Radial spherical plain bearings

Requiring maintenance  
 DIN ISO 12240-1,  
 dimension series G  
 Sealed



GE..-FO-2RS  
 Sliding contact surface  
 steel/steel



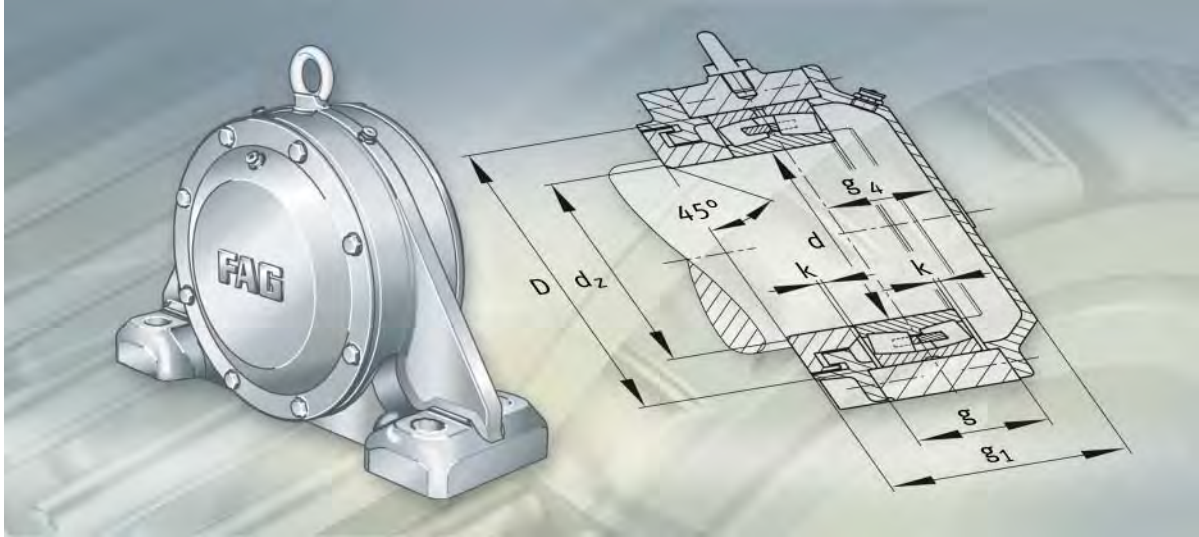
Mounting dimensions

**Dimension table** - Dimensions in mm

| Designation         | Mass<br>m<br>≈kg | Dimensions                  |                       |                      |                     |       |               |                    |
|---------------------|------------------|-----------------------------|-----------------------|----------------------|---------------------|-------|---------------|--------------------|
|                     |                  | d                           | D                     | B                    | C                   | $d_k$ | $\alpha$<br>° | $r_1, r_2$<br>min. |
| <b>GE200-FO-2RS</b> | 44,8             | <b>200<sub>-0,03</sub></b>  | 320 <sub>-0,04</sub>  | 165 <sub>-0,3</sub>  | 100 <sub>-0,8</sub> | 275   | 15            | 1,1                |
| <b>GE220-FO-2RS</b> | 50,9             | <b>220<sub>-0,03</sub></b>  | 340 <sub>-0,04</sub>  | 175 <sub>-0,3</sub>  | 100 <sub>-0,8</sub> | 300   | 16            | 1,1                |
| <b>GE240-FO-2RS</b> | 64,9             | <b>240<sub>-0,03</sub></b>  | 370 <sub>-0,04</sub>  | 190 <sub>-0,35</sub> | 110 <sub>-0,8</sub> | 325   | 15            | 1,1                |
| <b>GE260-FO-2RS</b> | 81,7             | <b>260<sub>-0,035</sub></b> | 400 <sub>-0,04</sub>  | 205 <sub>-0,35</sub> | 120 <sub>-0,8</sub> | 350   | 15            | 1,1                |
| <b>GE280-FO-2RS</b> | 96,5             | <b>280<sub>-0,035</sub></b> | 430 <sub>-0,045</sub> | 210 <sub>-0,35</sub> | 120 <sub>-0,9</sub> | 375   | 15            | 1,1                |

| Mounting dimensions    |                        | Basic load ratings           |                                | Radial internal clearance |
|------------------------|------------------------|------------------------------|--------------------------------|---------------------------|
| d <sub>a</sub><br>max. | D <sub>a</sub><br>min. | dyn.<br>C <sub>r</sub><br>kN | stat.<br>C <sub>0r</sub><br>kN | CN                        |
| 220                    | 267                    | 2 320                        | 11 600                         | 0,11 – 0,214              |
| 243,6                  | 295                    | 2 550                        | 12 700                         | 0,11 – 0,214              |
| 263,6                  | 319                    | 3 050                        | 15 300                         | 0,125 – 0,239             |
| 283,6                  | 342                    | 3 550                        | 18 000                         | 0,125 – 0,239             |
| 310,6                  | 370                    | 3 800                        | 19 000                         | 0,125 – 0,239             |





## Bearing housings



# Bearing housings

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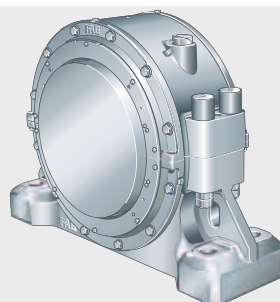
# Bearing housings

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# Product overview Bearing housings

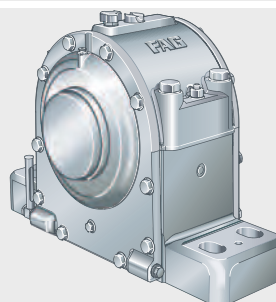
## Plummer block housings Split

KPG, KPGZ



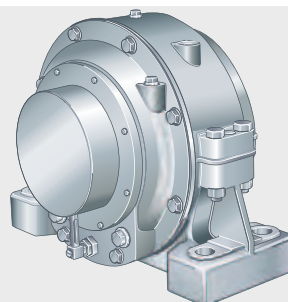
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LOE, LOU



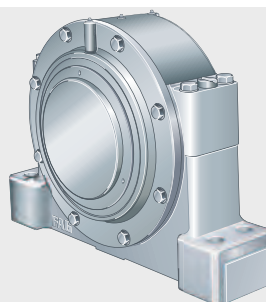
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PM



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RA



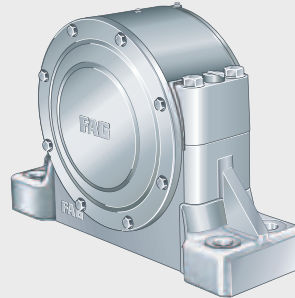
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# Product overview Bearing housings

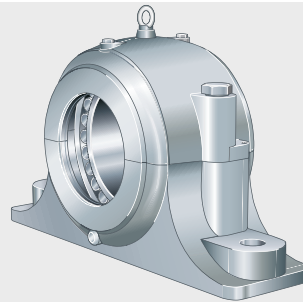
## Plummer block housings Split

RLE



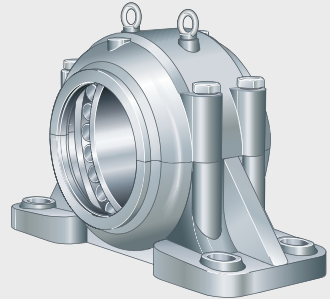
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S30



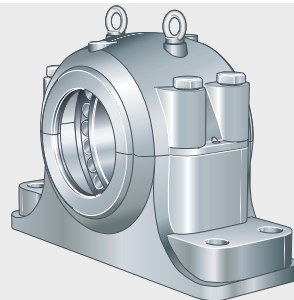
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SD5



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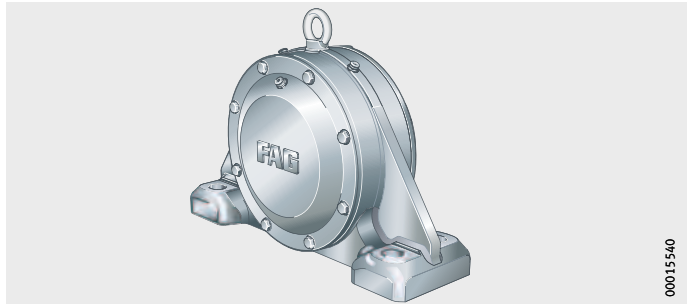
SD31



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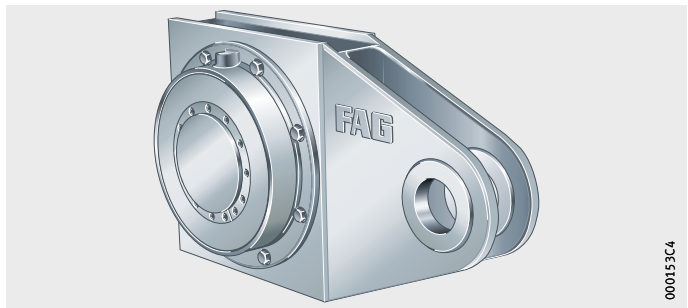
**Plummer block housings**  
Unsplit

BND, BNM



**Take-up housings**

SPA



# Bearing housings

## Features

FAG housings and the associated bearings form bearing units that have proven successful in machinery, plant and equipment. It is only possible, however, to show here a small selection of the numerous sizes and designs (for an overview of the FAG series housings, see TI WL 90-30). If other housings or housing designs are required, please contact us.

## Housing materials and outer surfaces

The normal material for the housings, depending on the series, is flake graphite cast iron, cast steel or spheroidal graphite cast iron. If a material other than the normal material is possible, a suffix must be used to indicate the material, i.e.:

- L for flake graphite cast iron (GG)
- S for cast steel (GS)
- D for spheroidal graphite cast iron (GGG).

Since the bearings are generally lubricated with grease and the initial grease filling lasts for a long period, most housings do not have relubrication holes. However, there are cast-on bosses or marks present so that lubrication holes can be made if necessary. If relubrication is carried out, it must be ensured that excess grease is allowed to escape.

All outer surfaces of the housings and housing parts not machined by chip-forming methods have a universal paint coating (colour RAL 7031, bluish grey). The coating can be finished using all synthetic resin, polyurethane, acrylic, epoxy resin, chlorinated rubber, nitrocellulose and acid-hardening hammer tone finishes. The anti-corrosion protection on the inner and outer surfaces machined by chip-forming methods can be easily removed.

## Locating and non-locating bearings

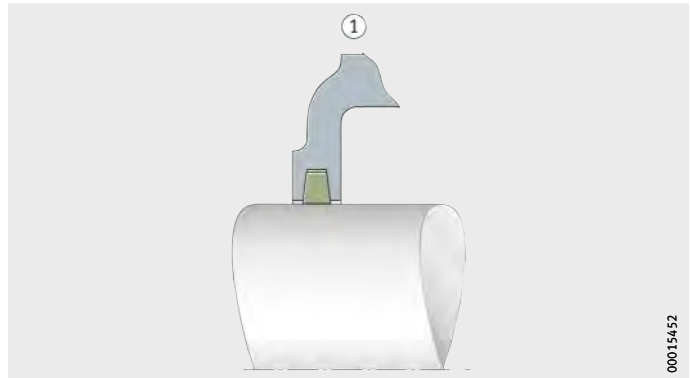
The bearing seats in the housing are generally machined such that the bearings are movable and can thus function as non-locating bearings. Locating bearing arrangements can be achieved by the insertion of locating rings if these are listed in the tables. Locating rings must be ordered separately. Housings without locating rings are supplied in a non-locating or locating bearing design.

## Sealing

For sealing of bearing housings according to the operating conditions, contact seals, non-contact seals and combinations of these are available, *Figure 1* to *Figure 3*, page 909.

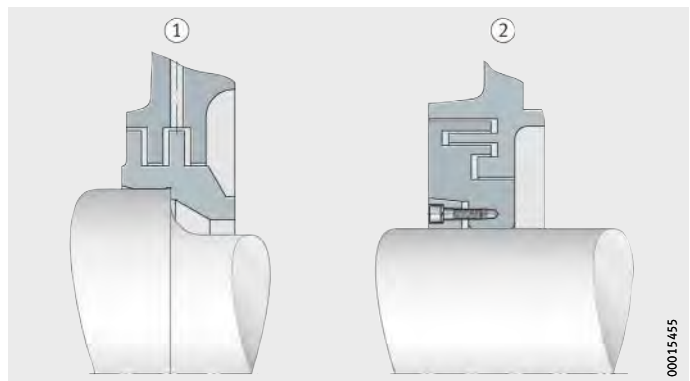
① Felt seal

*Figure 1*  
Example of contact seals



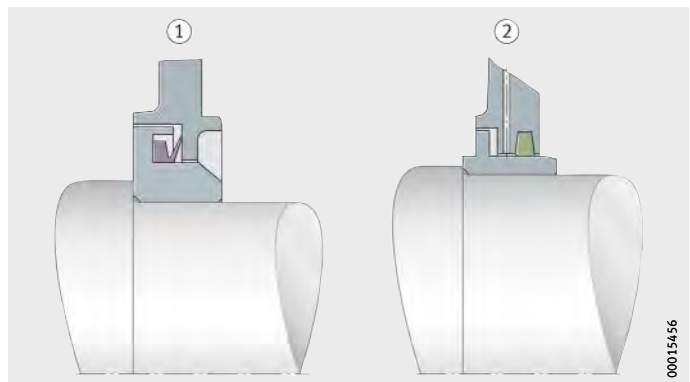
① Radial labyrinth  
② Axial labyrinth

*Figure 2*  
Examples of non-contact seals



① Labyrinth and V ring  
② Labyrinth and felt seal

*Figure 3*  
Examples of combined seals



# Bearing housings

## Split and unsplit plummer block housings

Large split and unsplit plummer block housings are generally intended for bearing arrangements with spherical roller bearings.

In split plummer block housings, the removable upper section of the housing is centred on the lower section by dowel pins, allowing easier mounting and maintenance. The upper sections must not be interchanged with each other.

In the case of split housings, the tolerance data for bearing seats are only valid for the delivered condition, i. e. before the screws connecting the upper and lower sections are loosened.

## Split plummer block housings KPG, KPGZ

Split plummer block housings KPG and KPGZ were developed specifically for trunnion bearing arrangements on converters.

Description of plummer block housings KPG and KPGZ: see also TPI 148, Rolling Bearing Arrangements for Converters.

## Dimensions, material

The housings are matched to the main dimensions of series 249.

The normal material for the housing body is cast steel (suffix S). Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

## Bearing seat and fitting of bearings

The housings KPG, *Figure 4*, page 911, are intended for spherical roller bearings with a tapered bore and sleeve, while the housings KPGZ, *Figure 5*, page 912, are intended for spherical roller bearings with a cylindrical bore.

The locating bearing on the drive side provides axial guidance of the converter.

The locating bearing design F of the housings KPG and KPGZ is originally designed for the fitting of unsplit spherical roller bearings. The locating bearing is formed by fitting locating rings on both sides of the bearing, *Figure 4* ①, page 911 and *Figure 5* ①, page 912.

A housing of design F can also accommodate a split spherical roller bearing, replacing an unsplit bearing, *Figure 4* ②, page 911 and *Figure 5* ②, page 912. As a result, the bearing can be replaced without dismantling the drive.

The non-locating bearing design L is fitted with unsplit bearings. The bearing outer ring can be displaced axially in a bearing bush.

## Seals and covers

The covers on both sides of the housings accommodate high-pressure packing as seals, *Figure 6* ①, page 912. Profiled rubber seals are available by agreement, *Figure 6* ②, page 912.



**Lubrication** The housings KPG and KPGZ are designed for grease lubrication. Lithium soap greases with effective EP and anti-corrosion additives should be used that preferably also contain an MoS<sub>2</sub> additive.

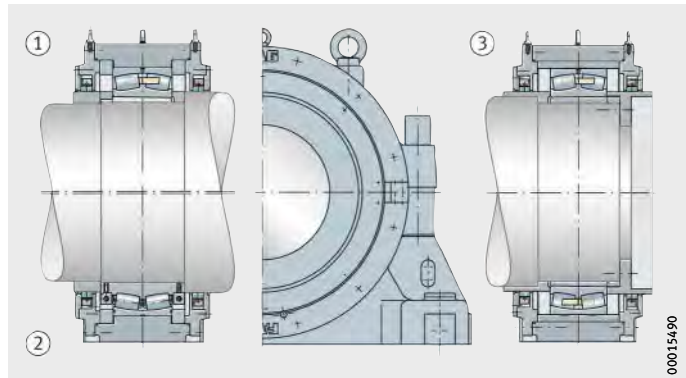
The housing cavities are filled to 60%, the bearings are completely filled. The grease quantities for the initial filling of the housings are given in the housing tables.

Relubrication should be carried out using the same grease as for the initial lubrication. The bearings are relubricated every three months with approx. 8% of the initial filling quantity.

The lubricant used for the bearings should also be used to relubricate the seals.

- ① Locating bearing F
- ② Locating bearing F with split bearing
- ③ Non-locating bearing L

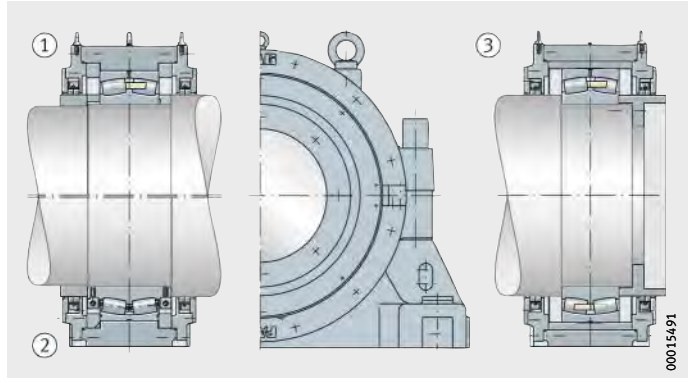
*Figure 4*  
Housing KPG for bearings  
with tapered bore and sleeve



# Bearing housings

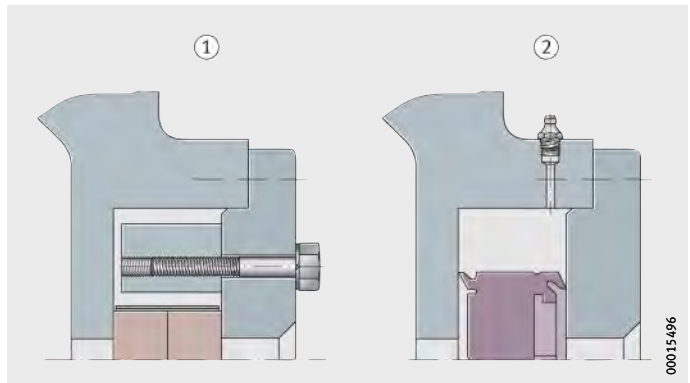
- ① Locating bearing F
- ② Locating bearing F with split bearing
- ③ Non-locating bearing L

*Figure 5*  
Housing KPGZ for bearings  
with cylindrical bore



- ① High-pressure packing
- ② Profiled rubber seal

*Figure 6*  
Seals for housings KPG and KPGZ



**Split plummer block housings  
LOE, LOU  
for oil lubrication**

Split plummer block housings LOE and LOU are designed for oil lubrication.

Plummer block housings LOE2, LOE3, LOU2 und LOU3 are fitted with spherical roller bearings of series 222 and 223 with a cylindrical bore, *Figure 7* to *Figure 10*, page 914.

The bearings are located on the shaft using an interference fit and axially secured by means of a locknut.

Housings of design A are closed on one side.

Housings of design B are intended for continuous shafts.

The housing is split, the labyrinth covers are unsplit.

The seal comprises two labyrinth rings.

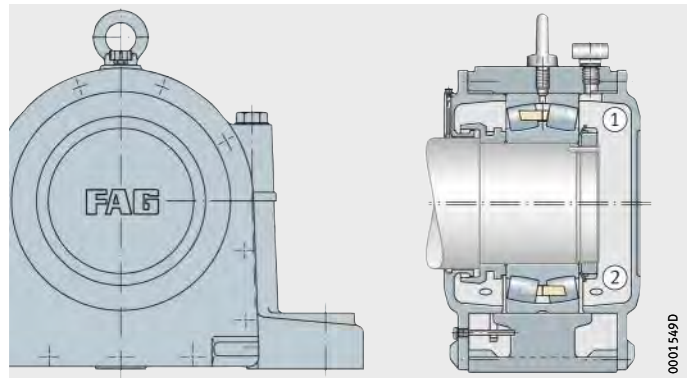
Labyrinth seals allow shaft misalignment of up to 0,25° in both directions. The grease chamber in the cover labyrinth can be relubricated. The housing base has four extended slots.

The eye bolt in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

The normal material for the housing body is flake graphite cast iron (suffix L). If required, housings are also available made from cast steel (suffix S) or spheroidal graphite cast iron (suffix D).

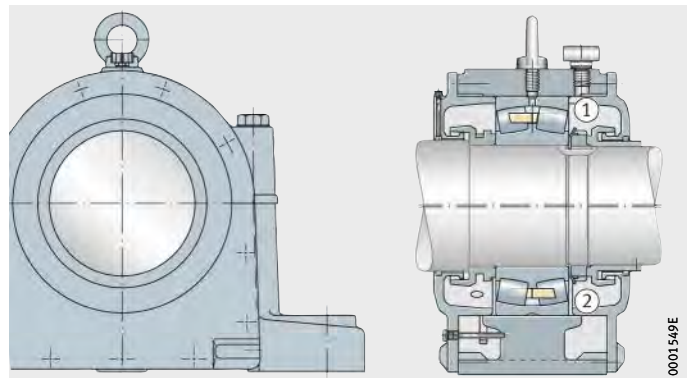
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 7*  
Plummer block housings  
LOE2, LOE3, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 8*  
Plummer block housings  
LOE2, LOE3, design B



# Bearing housings

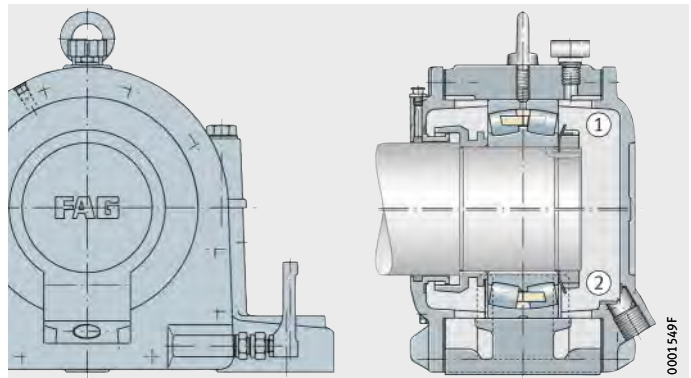
Plummer block housings of series LOE and LOU are suitable for high speed bearing arrangements and are designed for oil lubrication.

In the case of housings LOE, *Figure 7* and *Figure 8*, page 913 as well as *Figure 11* and *Figure 12*, page 915, the oil is supplied from the oil sump in the lower section of the housing to the rolling bearing by means of a ring oiler. An angled oil level indicator is screwed to one cover.

Housings of series LOU for recirculating oil lubrication, *Figure 9* and *Figure 10* as well as *Figure 13* and *Figure 14*, page 916, have an oil inlet connector in the upper section and an oil outlet connector in the lower section.

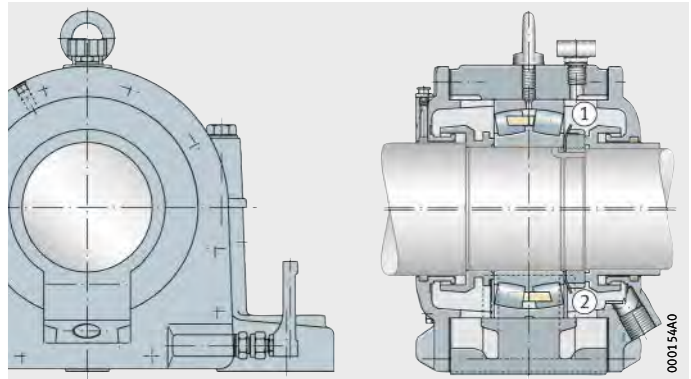
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 9*  
Plummer block housings  
LOU2, LOU3, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

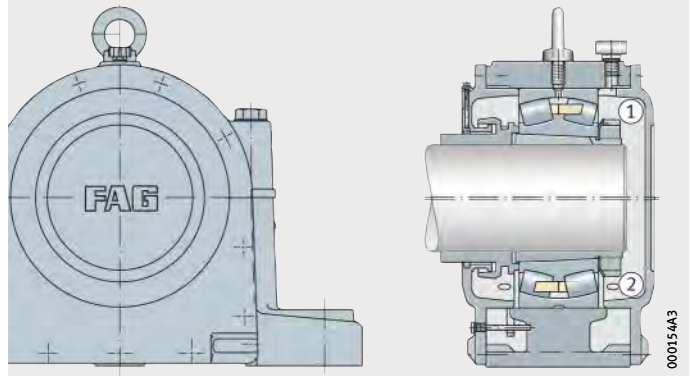
*Figure 10*  
Plummer block housings  
LOU2, LOU3, design B



Plummer block housings LOE5 and LOE6 as well as LOU5 and LOU6 are intended for the fitting of spherical roller bearings with a tapered bore and location by means of adapter sleeves, *Figure 11* to *Figure 14*, page 916.

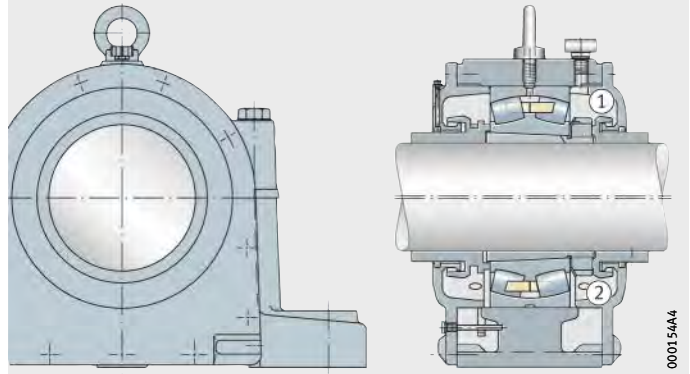
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 11*  
Plummer block housings  
LOE5, LOE6, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

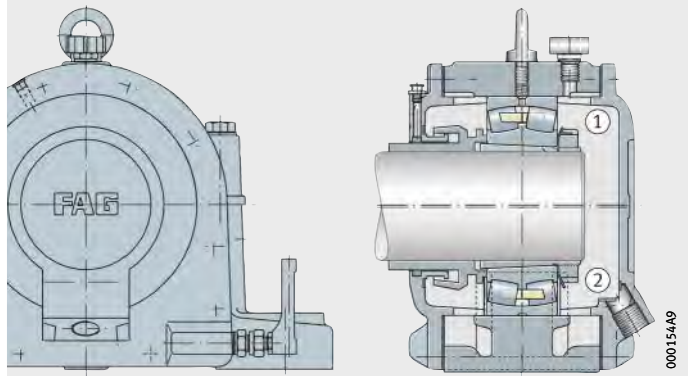
*Figure 12*  
Plummer block housings  
LOE5, LOE6, design B



# Bearing housings

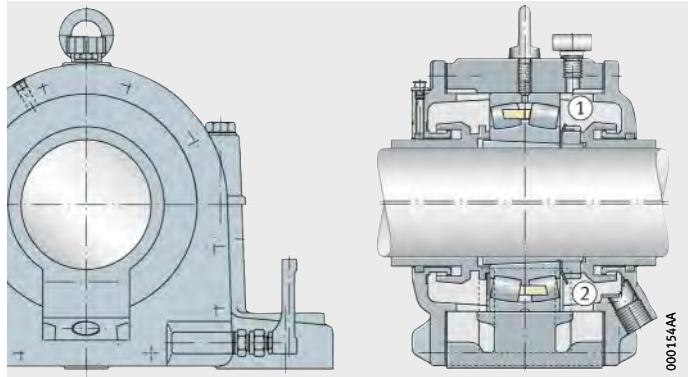
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 13*  
Plummer block housings  
LOU5, LOU6, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 14*  
Plummer block housings  
LOU5, LOU6, design B



## Split plummer block housings PM

Split plummer block housings of series PM30 were developed for the bearing arrangements of drying rolls and M.G. cylinders in paper machinery, but are also suitable for other applications.

The housings are fitted with spherical roller bearings of series 230..-K.

The shaft openings in the housings differ in design depending on whether the bearings are located using adapter sleeves (PM30..-H), *Figure 15* and *Figure 16*, or whether they are seated directly on the tapered shaft (PM30..-K), *Figure 17* and *Figure 18*, page 918.

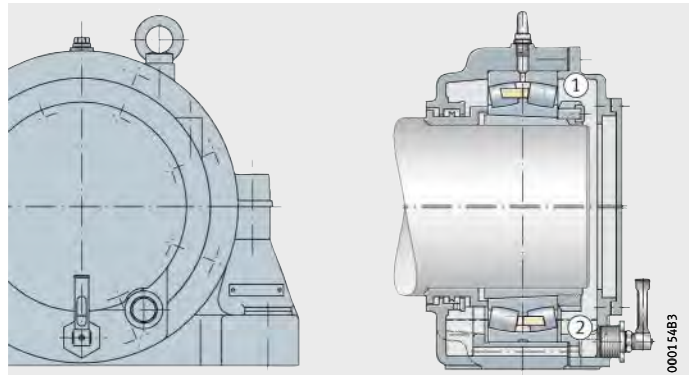
Housings for bearings with withdrawal sleeves (PM30..-AH) are available by agreement.

Locating bearing designs are available for shaft ends (AF) and for continuous shafts (BF).

A corresponding distinction is made for the non-locating designs AL and BL.

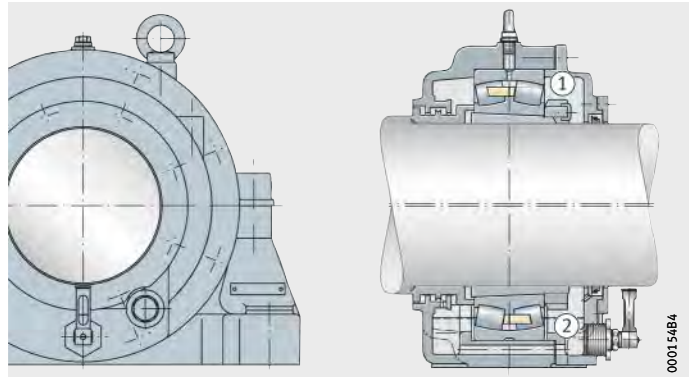
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 15*  
Plummer block housing PM30..-H  
for bearings with tapered bore and  
adapter sleeve, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 16*  
Plummer block housing PM30..-H  
for bearings with tapered bore and  
adapter sleeve, design B



# Bearing housings

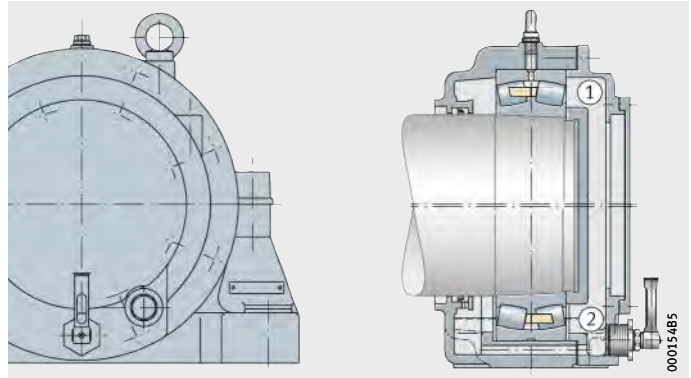
The normal material for the housing body is GG (suffix L).  
Housings made from GGG (suffix D) are also available by agreement.  
The housings are designed for oil sump lubrication.  
If recirculating oil lubrication is to be used, the housings must be converted.

The seal comprises a labyrinth.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

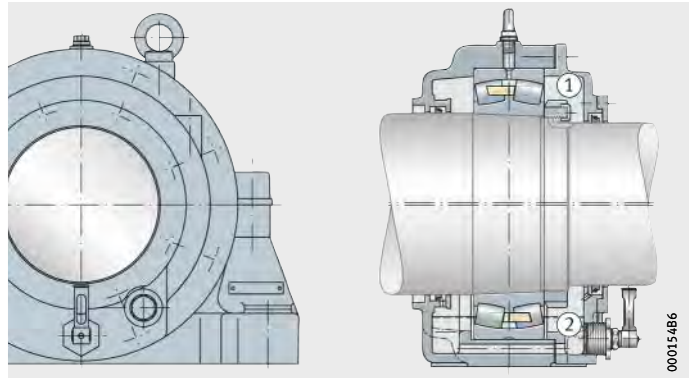
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 17*  
Plummer block housing PM30..-K  
for bearings with tapered bore,  
direct seat, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 18*  
Plummer block housing PM30..-K  
for bearings with tapered bore,  
direct seat, design B





**Split plummer block housings RA**

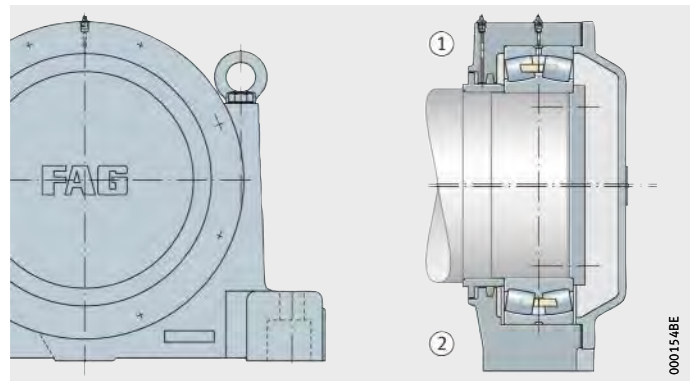
The split plummer block housings RA were originally developed for the bearing arrangements of pinion drives.

They are suitable for spherical roller bearings of series 230 and 239 with a cylindrical bore (housing RA..-Z), *Figure 19* and *Figure 20*, or for bearings of the same series with a tapered bore and withdrawal sleeve (housing RA..-AH), *Figure 21* and *Figure 22*, page 920.

The housings are produced as non-locating bearing housings or as locating bearing housings. When ordering housings of series RA..-Z and RA..-AH closed on one side, design A must be indicated in the order.

Housings RA..-Z and RA..-AH of design B are intended for continuous shafts.

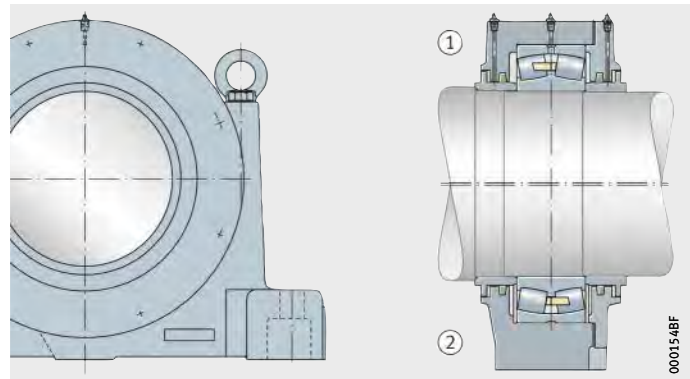
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)



*Figure 19*

Plummer block housing RA..-Z, for bearings with cylindrical bore, design A

- ① Locating bearing (BF)
- ② Non-locating bearing (BL)



*Figure 20*

Plummer block housing RA..-Z, for bearings with cylindrical bore, design B

# Bearing housings

The housings are designed for grease lubrication. Grease can be fed directly into the centre of the bearing for relubrication via a nipple in the upper section of the housing.

The labyrinth seal can also be relubricated.

The labyrinth is separated from the bearing cavity by a felt seal, so a more economical grease can be used for labyrinth lubrication.

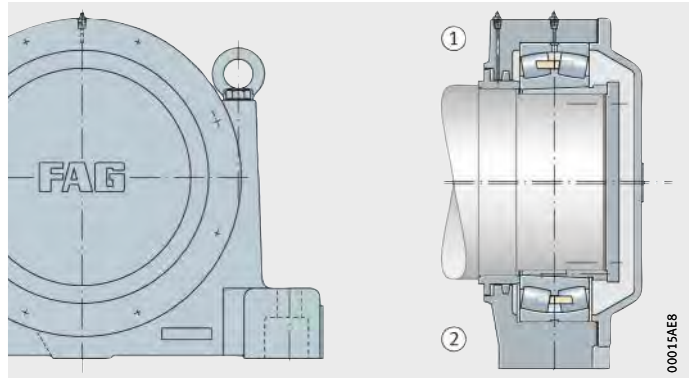
The normal material for the housing body is GG (suffix L).

Housings made from GGG (suffix D) are also available by agreement.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

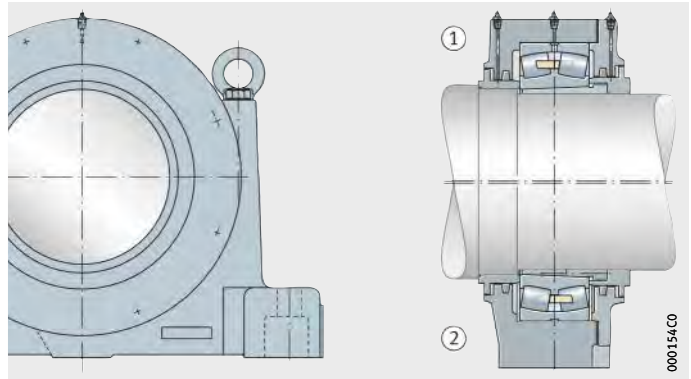
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 21*  
Plummer block housing RA...-AH,  
for bearings with tapered bore and  
withdrawal sleeve, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 22*  
Plummer block housing RA...-AH,  
for bearings with tapered bore and  
withdrawal sleeve, design B



## Split plummer block housings RLE

The split plummer block housings RLE were developed for the bearing arrangements of back-up rollers.

They are suitable for spherical roller bearings of series 241 with a cylindrical bore (housing design Z), *Figure 23* and *Figure 24*, or for bearings of the same series with a tapered bore and withdrawal sleeve (design AH), *Figure 25* and *Figure 26*, page 922.

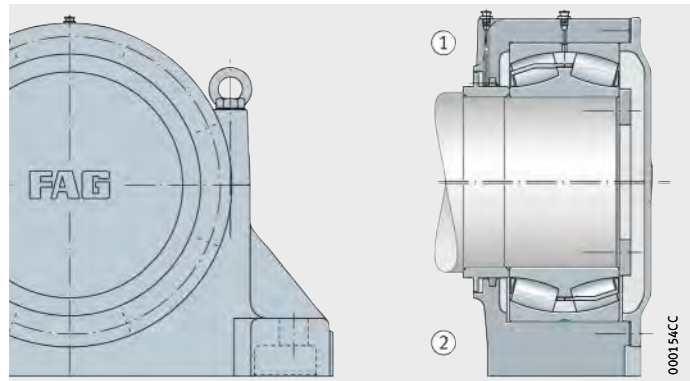
The housings are produced as non-locating bearing housings or as locating bearing housings. When ordering housings closed on one side, design A must be indicated in the order.

Housings of design B are intended for continuous shafts.

- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 23*

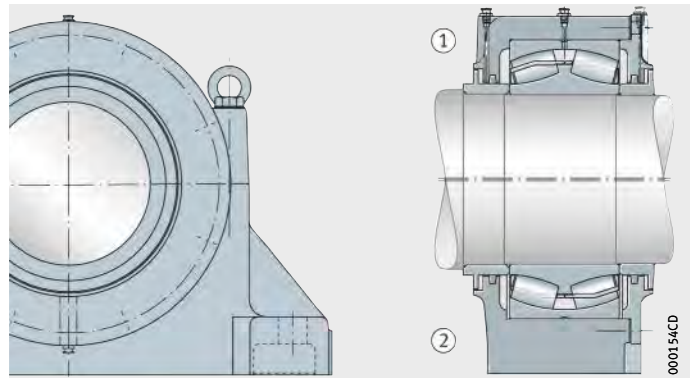
Plummer block housing RLE...Z,  
for bearings with cylindrical bore,  
design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 24*

Plummer block housing RLE...Z,  
for bearings with cylindrical bore,  
design B



# Bearing housings

The housings are designed for grease lubrication.

Grease can be fed into the bearing for relubrication via a nipple in the upper section of the housing.

The labyrinth seal can also be relubricated.

The labyrinth is separated from the bearing cavity by a felt seal, so a more economical grease can be used for labyrinth lubrication.

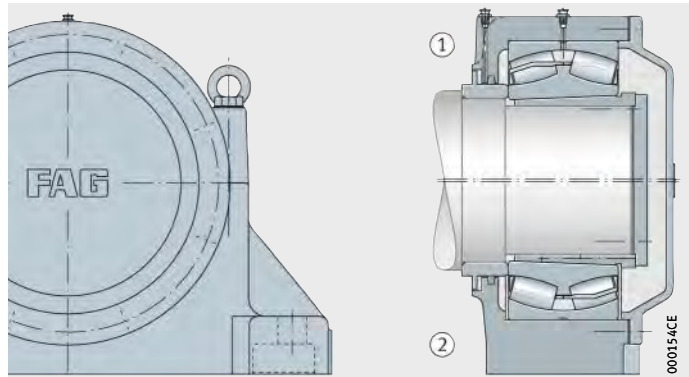
The normal material for the housing body is GG (suffix L).

Housings made from GS (suffix S) or GGG (suffix D) are also available by agreement.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

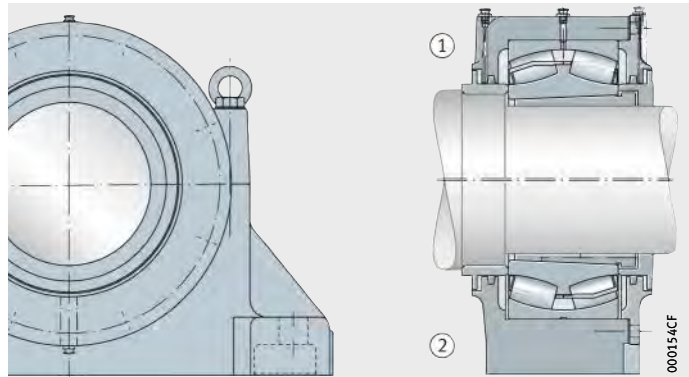
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 25*  
Plummer block housing RLE...-AH,  
for bearings with tapered bore and  
withdrawal sleeve, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 26*  
Plummer block housing RLE...-AH,  
for bearings with tapered bore and  
withdrawal sleeve, design B



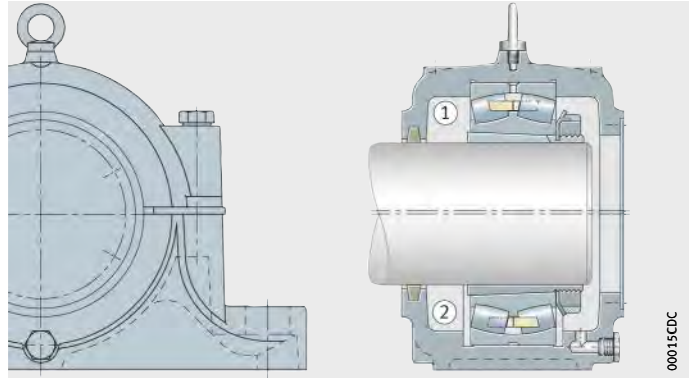
**Split plummer block housings  
S30**

Split plummer block housings for spherical roller bearings 230...-K with tapered bore and adapter sleeve, *Figure 27* and *Figure 28*.

The housings can also be fitted with split spherical roller bearings 230SM.

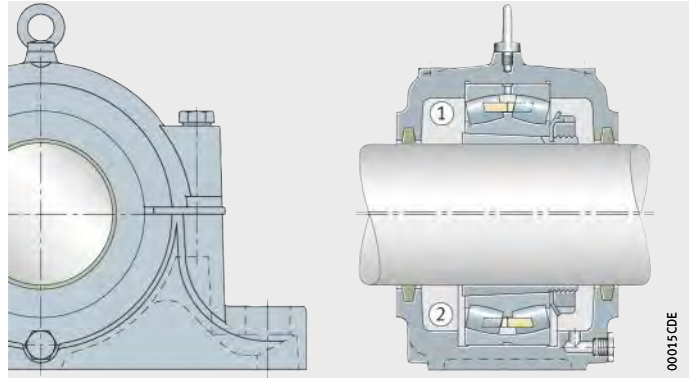
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 27*  
Plummer block housing S30  
from size S3044, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 28*  
Plummer block housing S30  
from size S3044, design B



# Bearing housings

## Plummer block housings of series S30 for spherical roller bearings of series 230..-K with tapered bore and adapter sleeve

The housings from S3044 are produced as non-locating bearing housings or as locating bearing housings. When ordering housings closed on one side, design A must be indicated in the order.

The cover is made from steel. Housings of design B are intended for continuous shafts.

The housings are sealed using felt strips (suffix FZ). Felt seals allow shaft misalignment of up to 0,5° in both directions. Labyrinth seals (suffix SS) or Taconite seals (suffix TCS) are also available by agreement.

Housings of series S30 can be relubricated via a lubrication connector in the centre of the housing.

The eye bolt must not be subjected to a load greater than the mass of the housing including the bearing.

The normal material used is flake graphite cast iron (suffix L). Housings made from GGG (D) or GS (S) are available by agreement.

Load carrying capacity: see also section Load carrying capacity of split plummer block housings, page 942.

The axial load carrying capacity is max. 35% of  $F_{180^\circ}$ .



### Lubrication

The quantities stated are valid for the initial filling of S30 housings. The bearings are thus filled completely and the housing cavities are filled to 60%.

### Recommended grease quantity

| Housing | Grease quantity for initial filling<br>≈g |
|---------|---|
| S3044   | 2 700                                     |
| S3048   | 2 700                                     |
| S3052   | 3 700                                     |
| S3056   | 4 200                                     |
| S3060   | 5 200                                     |
| S3064   | 5 500                                     |
| S3068   | 6 800                                     |
| S3072   | 7 200                                     |
| S3076   | 8 600                                     |
| S3080   | 10 400                                    |
| S3084   | 12 000                                    |
| S3088   | 13 200                                    |
| S3092   | 14 600                                    |
| S3096   | 15 100                                    |

## Split plummer block housings SD5

Split plummer block housings of series SD5 are combined with spherical roller bearings, seals and grease filling to form bearing units, for use in applications such as general machine building.

The dimensions of split plummer block housings SD5 are matched to spherical roller bearings of series 222..-K with adapter sleeve and split spherical roller bearings 222SM.

In design A for bearing arrangements on shaft ends, one side is closed off by a cover, *Figure 29*.

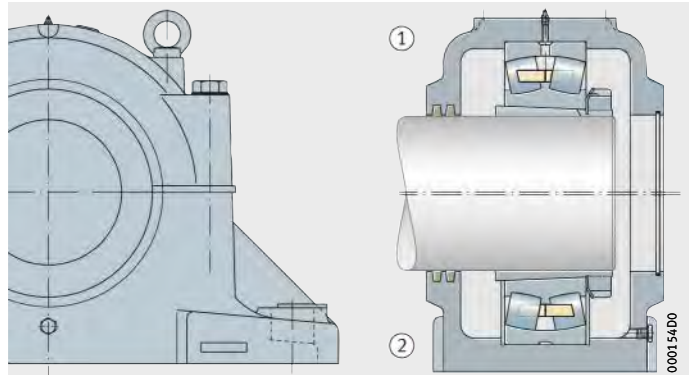
Design B is intended for continuous shafts, *Figure 30*.

The normal material for the housing body is flake graphite cast iron (suffix L). Housings made from GGG (suffix D) or GS (suffix S) are also available by agreement.

- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 29*

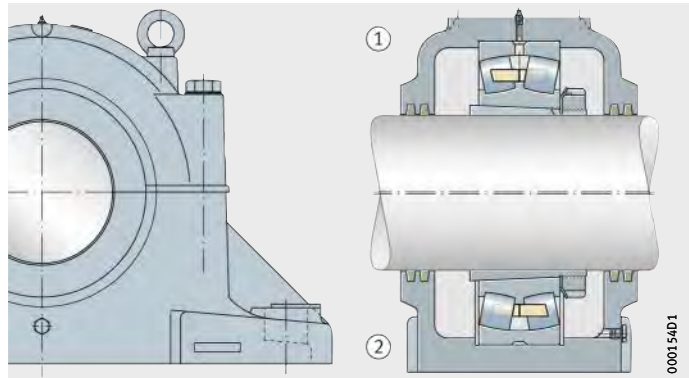
Plummer block housing SD5 for bearings with tapered bore and adapter sleeve, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 30*

Plummer block housing SD5 for bearings with tapered bore and adapter sleeve, design B



# Bearing housings

|   |  |
|---|--|
| <b>Bearing seat and fitting of bearings</b> | <p>The bearing seat in the housing is machined to H7. The housings are supplied as a locating bearing design or non-locating bearing design.</p> <p>Shaft seats for bearings with a tapered bore seated on adapter sleeves should be machined to h8.</p> <p>Housings SD5 can be fitted with spherical roller bearings 222..-K with adapter sleeve and split spherical roller bearings 222SM.</p> |
| <b>Lubrication</b>                          | <p>The housings are designed for grease lubrication. Housings of the normal design have the suffix N. For housings with grease valves, the suffix R is used.</p>   |
| <b>Sealing</b>                              | <p>Plummer block housings SD5 are generally sealed on one side (design A) or on both sides (design B) with felt seals (suffix FZ). Housings with labyrinth seals (SS) are also available by agreement.</p>   |

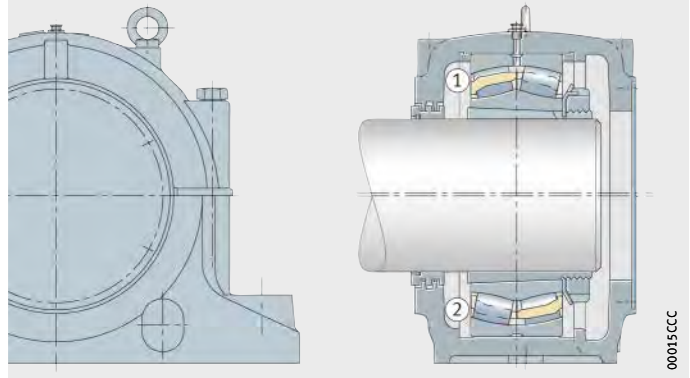


**Split plummer block housings  
SD31**

Split plummer block housings for spherical roller bearings 231...-K with tapered bore and adapter sleeves, *Figure 31 to Figure 34*, page 928.

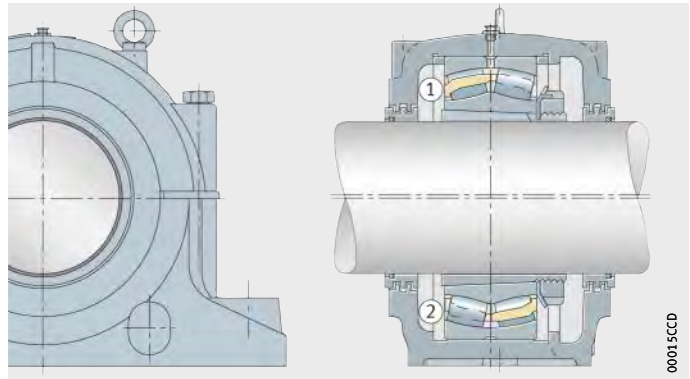
- ① Locating bearing
- ② Non-locating bearing

*Figure 31*  
Plummer block housing SD31  
up to and including size SD3140,  
design A



- ① Locating bearing
- ② Non-locating bearing

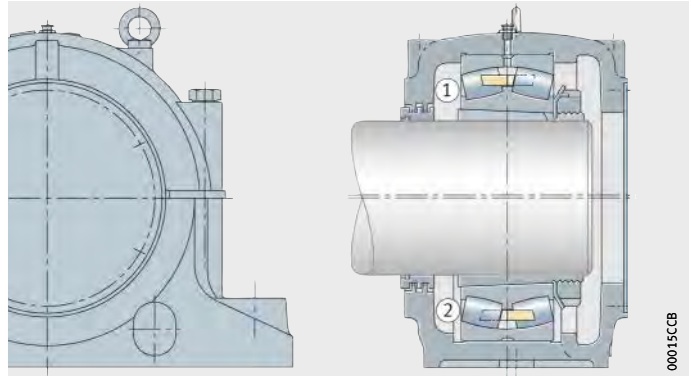
*Figure 32*  
Plummer block housing SD31  
up to and including size SD3140,  
design B



## Bearing housings

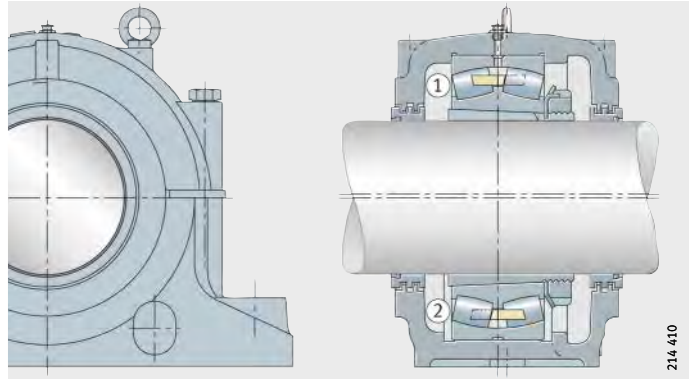
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 33*  
Plummer block housing SD31  
from size SD3144, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 34*  
Plummer block housing SD31  
from size SD3144, design B



### Plummer block housings of series SD31 for spherical roller bearings of series 231..-K with tapered bore and adapter sleeve

These housings are intended for bearing arrangements subjected to heavy loads. The bearings are located on the shaft by means of adapter sleeves. The housings can also be fitted with split spherical roller bearings 231SM.

From SD3144, the housings are supplied as a locating bearing design or non-locating bearing design. Smaller housings initially give non-locating bearing arrangements. Locating bearing arrangements can be achieved by the insertion of locating rings on both sides of the bearing. Locating rings must be ordered separately.

The housings are intended for grease lubrication and can be relubricated via a lubrication nipple.

For the holes required for oil lubrication, the upper and lower section of the housings have cast-on bosses.

The seal comprises a three-section labyrinth (TS). Labyrinth seals allow shaft misalignments of 0,25° in both directions. Housings with Taconite seals (D) are also available by agreement. Housings closed on one side (design A) are supplied with a steel cover.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

The normal material used is flake graphite cast iron (suffix L). Housings made from GGG (D) or GS (S) are available by agreement.

Load carrying capacity: see also section Load carrying capacity of split plummer block housings, page 942.

The axial load carrying capacity is max.  $\frac{2}{3}$  of  $F_{180^\circ}$ .



### Lubrication

The quantities stated are valid for the initial filling of SD31 housings. The bearings are thus filled completely and the housing cavities are filled to 60%.

### Recommended grease quantity

| Housing | Grease quantity for initial filling<br>≈ g |
|---------|--|
| SD3138  | 2 800                                      |
| SD3140  | 3 600                                      |
| SD3144  | 4 200                                      |
| SD3148  | 5 200                                      |
| SD3152  | 6 700                                      |
| SD3156  | 7 000                                      |
| SD3160  | 10 000                                     |
| SD3164  | 12 000                                     |
| SD3168  | 18 000                                     |
| SD3172  | 18 000                                     |
| SD3176  | 23 000                                     |
| SD3180  | 23 000                                     |
| SD3184  | 32 000                                     |
| SD3188  | 32 000                                     |
| SD3192  | 40 000                                     |
| SD3196  | 40 000                                     |



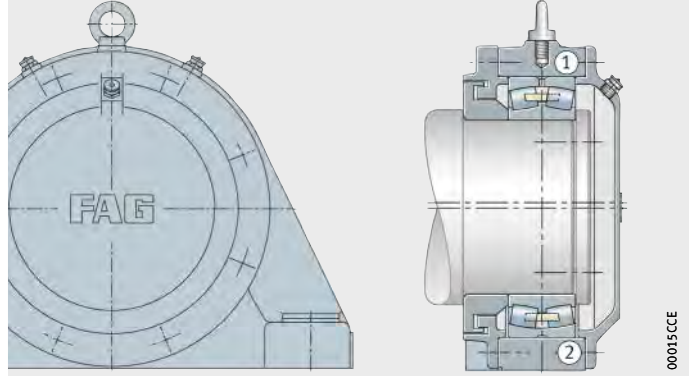
# Bearing housings

## Unsplit plummer block housings BND

Unsplit FAG housings of series BND are combined with FAG spherical roller bearings, seals and grease filling to form bearing units for very high demands, *Figure 35* to *Figure 46*, page 933.

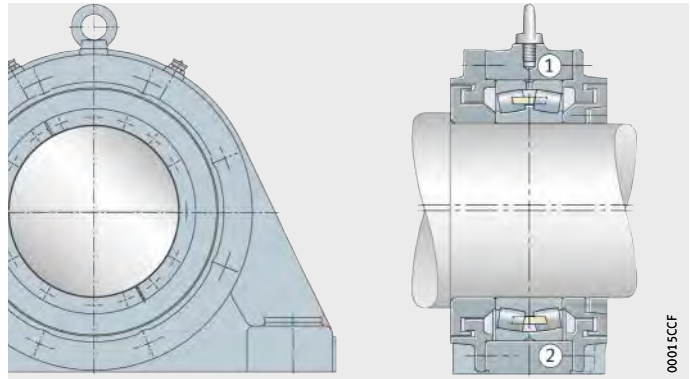
- ① Locating bearing BND..-Z-Y-AF-S
- ② Non-locating bearing BND..-Z-Y-AL-S

*Figure 35*  
Plummer block housing BND  
for bearings with cylindrical bore  
(labyrinth seal), design A



- ① Locating bearing BND..-Z-Y-BF-S
- ② Non-locating bearing BND..-Z-Y-BL-S

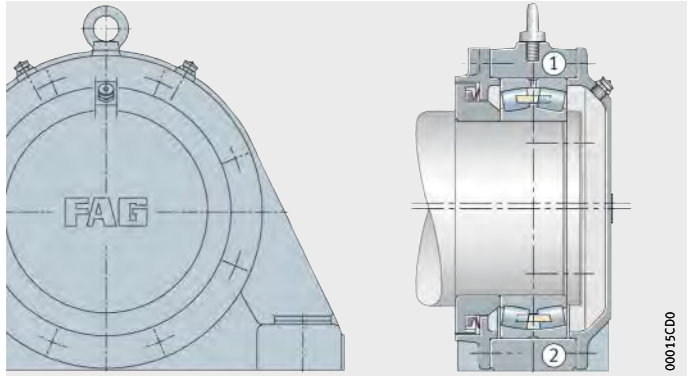
*Figure 36*  
Plummer block housing BND  
for bearings with cylindrical bore  
(labyrinth seal), design B



- ① Locating bearing BND...Z-T-AF-S
- ② Non-locating bearing BND...Z-T-AL-S

*Figure 37*

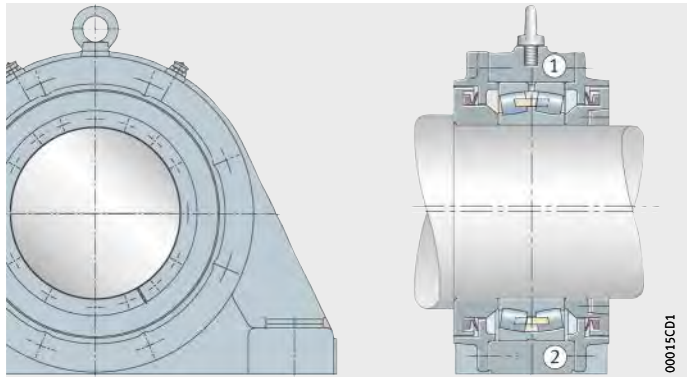
Plummer block housing BND for bearings with cylindrical bore (Taconite seal), design A



- ① Locating bearing BND...Z-T-BF-S
- ② Non-locating bearing BND...Z-T-BL-S

*Figure 38*

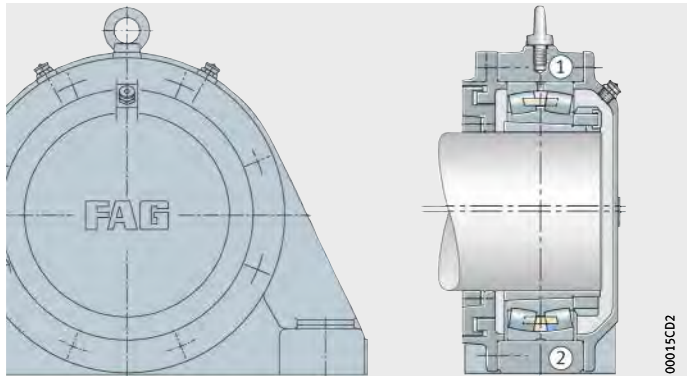
Plummer block housing BND for bearings with cylindrical bore (Taconite seal), design B



- ① Locating bearing BND...H-W-Y-AF-S
- ② Non-locating bearing BND...H-W-Y-AL-S

*Figure 39*

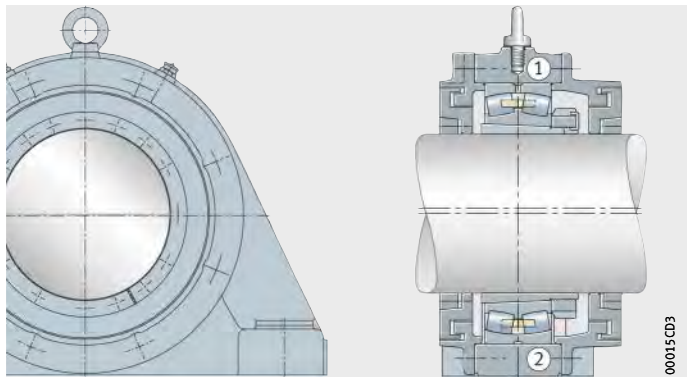
Plummer block housing BND for bearings with tapered bore and adapter sleeve (labyrinth seal), design A



- ① Locating bearing BND...H-W-Y-BF-S
- ② Non-locating bearing BND...H-W-Y-BL-S

*Figure 40*

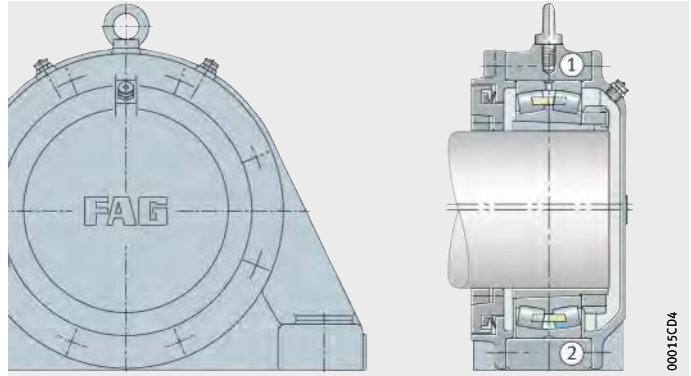
Plummer block housing BND for bearings with tapered bore and adapter sleeve (labyrinth seal), design B



# Bearing housings

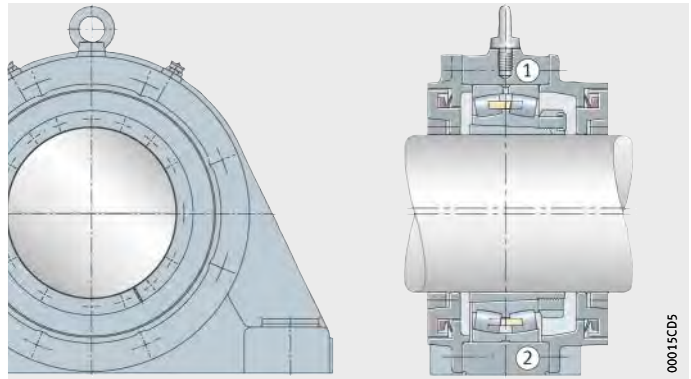
- ① Locating bearing BND...H-W-T-AF-S
- ② Non-locating bearing BND...H-W-T-AL-S

*Figure 41*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve (Taconite seal), design A



- ① Locating bearing BND...H-W-T-BF-S
- ② Non-locating bearing BND...H-W-T-BL-S

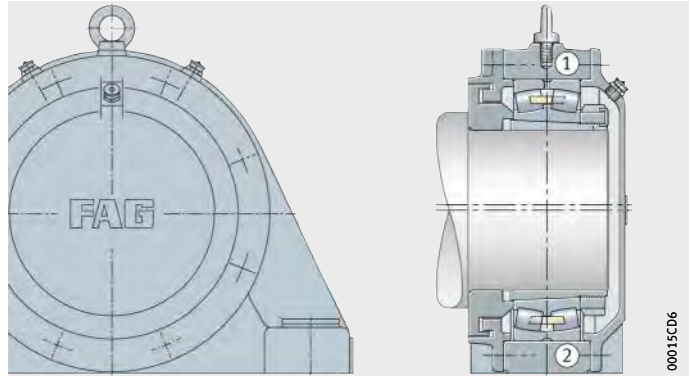
*Figure 42*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve (Taconite seal), design B



- ① Locating bearing BND...H-C-Y-AF-S
- ② Non-locating bearing BND...H-C-Y-AL-S

*Figure 43*

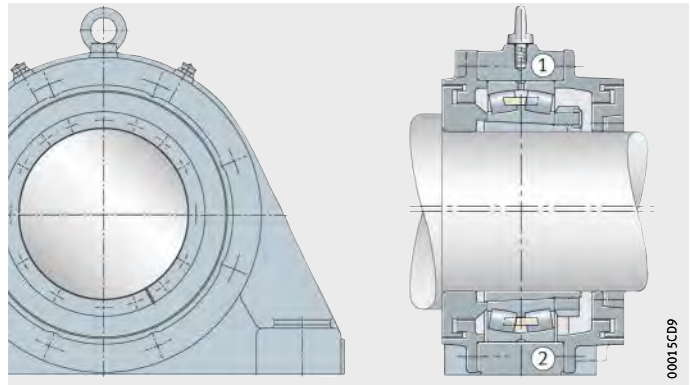
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (labyrinth seal), design A



- ① Locating bearing BND...H-C-Y-BF-S
- ② Non-locating bearing BND...H-C-Y-BL-S

*Figure 44*

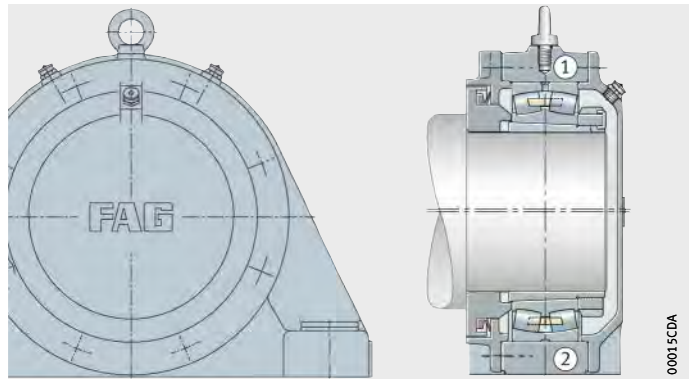
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (labyrinth seal), design B



- ① Locating bearing BND...H-C-T-AF-S
- ② Non-locating bearing BND...H-C-T-AL-S

*Figure 45*

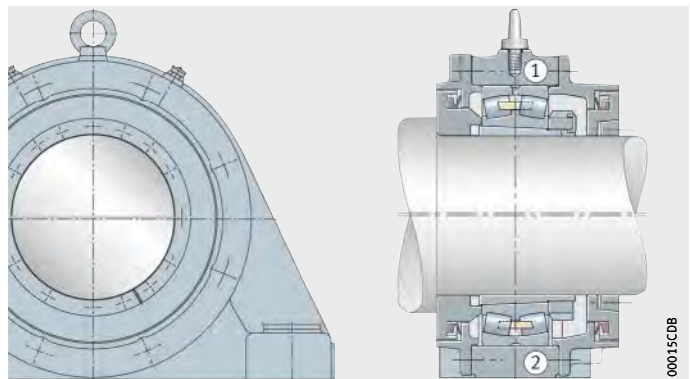
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (Taconite seal), design A



- ① Locating bearing BND...H-C-T-BF-S
- ② Non-locating bearing BND...H-C-T-BL-S

*Figure 46*

Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (Taconite seal), design B



# Bearing housings

Unsplit housings of series BND, originally developed for belt conveyors, can also be beneficially used in materials processing, for example in hard crushers and sugar cane mill drives as well as on rotor shafts in wind turbines. The dimensions of housings BND are matched to spherical roller bearings of series 222, 230, 231 and 232. In housings BND of design A for the bearing arrangements of shaft ends, one side is closed by a cover.

Design B is intended for continuous shafts. The housing body, labyrinth rings and cover are unsplit. The labyrinth rings are located by means of split tapered rings made from laminated fabric material. The labyrinth gaps are dimensioned so that the shaft can undergo deflection of approx. 0,5° in both directions without the labyrinths touching the bore.

**Material** The standard material for the housing bodies is cast steel (suffix S). If required, housing bodies made from spheroidal graphite cast iron (suffix D) are available.

**Bearing seat and fitting of bearings** The bearing seat in the housing is machined to H7. The housings are supplied as a locating bearing design or non-locating bearing design. In the locating bearing, the bearing is clamped between the housing covers. In the non-locating bearing, the bearing can align itself axially, since the covers have shorter centring collars. Housings BND can accommodate rolling bearings with a cylindrical bore that are seated directly on a stepped shaft. We recommend machining the shaft to m6 for these bearings. Shaft seats for bearings with a tapered bore seated on adapter sleeves should be machined to h8.



**Seals** Plummer block housings BND are sealed on one side (design A) or on both sides (design B) with labyrinths (suffix Y). If required, Taconite seals (suffix T) are available with a V ring integrated in the labyrinth (these must be provided with a separate relubrication facility).

**Load carrying capacity** Guide values for the rupture load of housings BND: see section Housings BND, page 946. When determining the permissible load, a safety factor of 6 should be applied to the housing rupture load.



Housings BND have a maximum axial load carrying capacity corresponding to 20% of the housing rupture load  $F_{180^\circ}$ . For load directions between 55° and 120° and axial load, we recommend that the housings should be secured in the load direction by means of stops or dowels.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

**Lubrication** The housings BND are designed for grease lubrication. Suitable lubricants are lithium soap greases of consistency 2 and 3, for example the rolling bearing grease MULTIP for low loads and MULTITOP and LOAD400 for high and very high loads.

The housings have button head lubrication nipples with a head diameter standardised to DIN 3 404 of 22 mm. The grease is fed uniformly to both rows of rollers via the circumferential slot and three lubrication holes in the outer ring of the spherical roller bearings.

In initial lubrication, the cavities in the bearing, the housing and the labyrinths are completely filled with grease.

Recommended grease quantities: see table, page 936.

The relubrication intervals should be matched to the environmental conditions. The bearings should be relubricated after an interval of no more than four weeks.

For relubrication, we recommend approx. 10% of the grease used for initial filling. For machinery operating in highly contaminated environments, relubrication should be carried out daily with small quantities.

The quantities stated are valid for the initial filling of BND housings. The bearings and housing cavities are thus filled completely.



# Bearing housings

## Recommended grease quantity

| Bearing bore<br>mm | Grease quantity for initial filling |             |
|--------------------|-------------------------------------|-------------|
|                    | BND22, BND31, BND32<br>≈g           | BND30<br>≈g |
| 180                | 2 500                               | –           |
| 190                | 3 000                               | –           |
| 200                | 3 600                               | –           |
| 220                | 4 200                               | 1 900       |
| 240                | 5 000                               | 2 100       |
| 260                | 6 000                               | 2 500       |
| 280                | 7 000                               | 3 000       |
| 300                | 8 000                               | 3 500       |
| 320                | 9 000                               | 4 100       |
| 340                | 10 500                              | 4 800       |
| 360                | 12 000                              | 5 500       |
| 380                | 13 000                              | 6 200       |
| 400                | 14 500                              | 7 000       |
| 420                | 16 000                              | 8 000       |

## Unsplit plummer block housings BNM

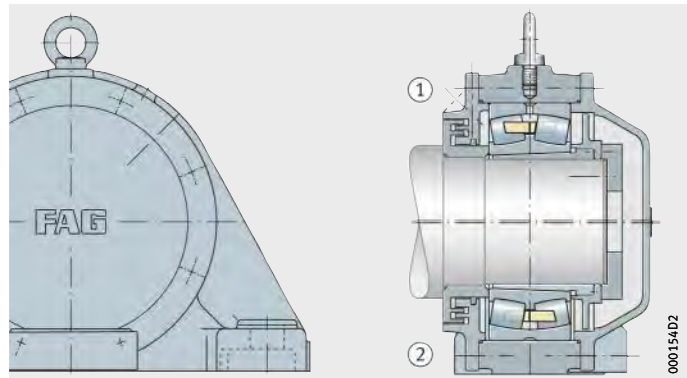
Unsplit FAG housings of series BNM are combined with spherical roller bearings with tapered bore and withdrawal sleeves, seals and grease filling to form bearing units, *Figure 47* and *Figure 48*. The housings are used in applications such as mills.

The dimensions of unsplit plummer block housings BNM are matched to spherical roller bearings of series 232...-K. In housings BNM of design A for the bearing arrangements of shaft ends, one side is closed by a cover. Design B is intended for continuous shafts. The housing body, labyrinth rings and cover are unsplit. The normal material for the housing body is cast steel.

- ① Locating bearing BNM...AH-R-AF
- ② Non-locating bearing BNM...AH-R-AL

*Figure 47*

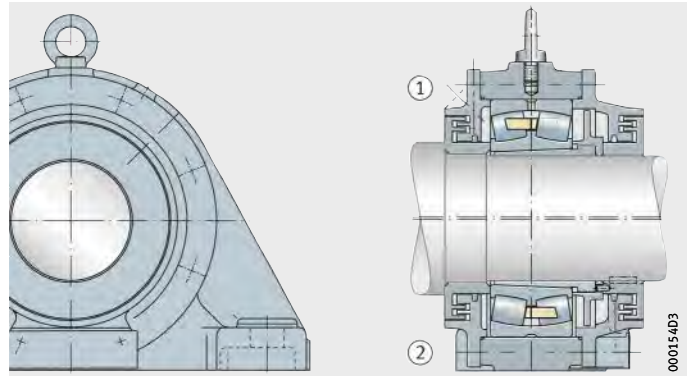
Plummer block housing BNM for bearings with tapered bore and withdrawal sleeve, design A



- ① Locating bearing BNM...AH-R-BF
- ② Non-locating bearing BNM...AH-R-BL

*Figure 48*

Plummer block housing BNM for bearings with tapered bore and withdrawal sleeve, design B



# Bearing housings

|   |   |
|---|---|
| <b>Bearing seat and fitting of bearings</b> | The bearing seat in the housing is machined to H7. The housings are supplied as a locating bearing design or non-locating bearing design. In the locating bearing, the bearing is clamped between the housing covers. In the non-locating bearing, the bearing can align itself axially, since the covers have shorter centring collars. Shaft seats for bearings with a tapered bore seated on adapter sleeves should be machined to h8. |
| <b>Lubrication</b>                          | The housings BNM are designed for grease lubrication. For operation at high speeds, the housings have grease valves (suffix R). Plummer block housings BNM are sealed on one side (design A) or on both sides (design B) by labyrinths.   |

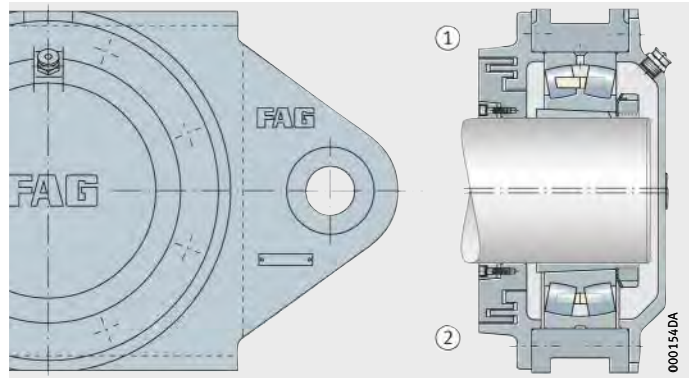
**Take-up housings**  
**Unsplit take-up housings**  
**SPA**

Unsplit FAG housings of series SPA are combined with FAG spherical roller bearings, seals and grease filling to form bearing units for very high demands, *Figure 49* and *Figure 50*.

- ① Locating bearing SPA...H-W-Y-AF-S
- ② Non-locating bearing SPA...H-W-Y-AL-S

*Figure 49*

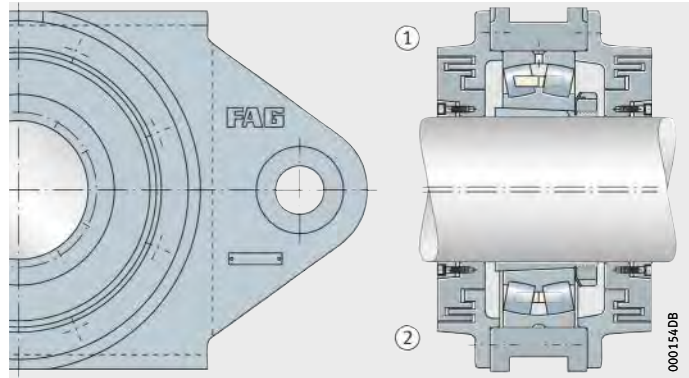
Take-up housing SPA for bearings with tapered bore and adapter sleeve (labyrinth seal), design A



- ① Locating bearing SPA...H-W-Y-BF-S
- ② Non-locating bearing SPA...H-W-Y-BL-S

*Figure 50*

Take-up housing SPA for bearings with tapered bore and adapter sleeve (labyrinth seal), design B



Housings of series SPA were developed specifically for tensioner drum bearing arrangements in belt conveyor plant. A yoke-shaped drawbar eye is cast on for attachment to the tensioning device. The housing is guided by means of rails in the belt support structure. The dimensions of housings SPA are matched to spherical roller bearings of series 222, 230, 231 and 232. In housings SPA of design A for the bearing arrangements of shaft ends, one side is closed by a cover. Design B is intended for continuous shafts. The housing body, cover and labyrinth rings are unsplit. The labyrinth rings are located by means of split tapered rings made from laminated fabric material. The labyrinth gaps are dimensioned so that the shaft can undergo deflection of approx. 0,5° in both directions without the labyrinths touching the bore.

# Bearing housings

|   |   |
|---|---|
| <b>Material</b>                             | The standard material for the housing bodies is cast steel (suffix S). If required, housing bodies made from spheroidal graphite cast iron (suffix D) are available.  |
| <b>Bearing seat and fitting of bearings</b> | <p>The bearing seat in the housing is machined to H7. The housings are supplied as a locating bearing design or non-locating bearing design. In the locating bearing (F), the bearing is clamped between the housing covers. In the non-locating bearing (L), the bearing can align itself axially, since the covers have shorter centring collars.</p> <p>The housings can accommodate spherical roller bearings with a tapered bore located on adapter sleeves.<br/>For machining of the shaft seat, we recommend the tolerance h8.</p> |
| <b>Seals</b>                                | Take-up housings SPA are sealed on one side (design A) or on both sides (design B) by labyrinths (suffix Y). If required, Taconite seals (suffix T) are available with a V ring integrated in the labyrinth (these must be provided with a separate relubrication facility).  |

**Lubrication** The housings SPA are designed for grease lubrication. Suitable lubricants are lithium soap greases of consistency 2 or 3, for example the rolling bearing grease MULTI3 for low loads and MULTITOP and LOAD400 for high and very high loads. The housings have button head lubrication nipples with a head diameter standardised to DIN 3404 of 22 mm. The grease is fed uniformly to both rows of rollers via the circumferential slot and three lubrication holes in the outer ring of the spherical roller bearings. In initial lubrication, the cavities in the bearing, the housing and the labyrinths are completely filled with grease. Recommended grease quantities: see table.

The relubrication intervals should be matched to the environmental conditions. The bearings should be relubricated after an interval of no more than four weeks.

For relubrication, we recommend approx. 10% of the grease used for initial filling. For machinery operating in highly contaminated environments, relubrication should be carried out daily with small quantities.

The quantities stated are valid for the initial filling of SPA housings. The bearings and housing cavities are thus filled completely.

**Recommended grease quantity**

| Bearing bore<br>mm | Grease quantity for initial filling |             |
|--------------------|-------------------------------------|-------------|
|                    | SPA22, SPA31, SPA32<br>≈g           | SPA30<br>≈g |
| 180                | 2 500                               | –           |
| 190                | 3 000                               | –           |
| 200                | 3 600                               | –           |
| 220                | 4 200                               | 1 900       |
| 240                | 5 000                               | 2 100       |
| 260                | 6 000                               | 2 500       |
| 280                | 7 000                               | 3 000       |
| 300                | 8 000                               | 3 500       |
| 320                | 9 000                               | 4 100       |
| 340                | 10 500                              | 4 800       |
| 360                | 12 000                              | 5 500       |
| 380                | 13 000                              | 6 200       |
| 400                | 14 500                              | 7 000       |
| 420                | 16 000                              | 8 000       |



# Bearing housings

## Design and safety guidelines

### Load carrying capacity of split plummer block housings

The permissible load on the housing is dependent on the strength of the housing and connecting screws, the load carrying capacity of the bearing and on the load direction.

Guide values for the rupture load of the housings and the maximum load carrying capacity of the screws connecting the upper and lower sections of the housing for housings S30 and SD31 are given on pages 943 and 944. Values for other split housings are available by agreement.

When determining the permissible load, safety factors must be applied. For general machine building, a safety factor of 6 relative to the housing rupture load is normally applied.

The values in the tables apply if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H. A precondition for supporting loads is that the housing base surface is completely and rigidly supported.



Housings SD31 have a maximum axial load carrying capacity corresponding to  $\frac{2}{3}$  of the housing rupture load  $F_{180^\circ}$ , housings S30 have a maximum axial load carrying capacity corresponding to 35% of  $F_{180^\circ}$ . For load directions between 55% and 120% and axial load, we recommend that the housings should be secured in the load direction by means of stops or dowels.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.



## Housings S30

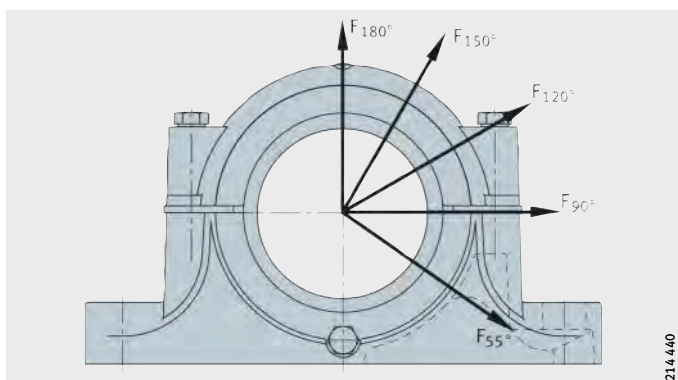


Figure 51

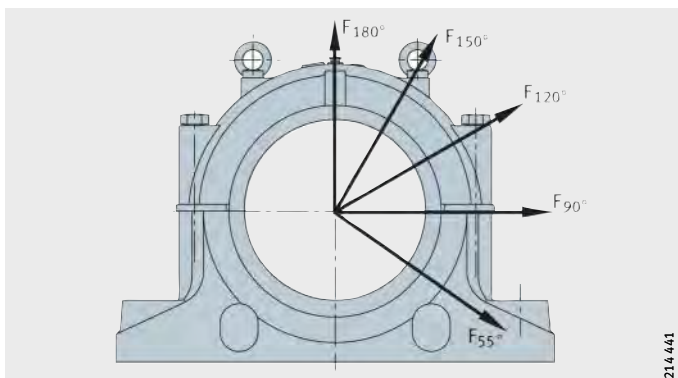
Guide values for the rupture load of housings S30 and the maximum load carrying capacity of the connecting screws (tightening torques, see also page 947)

| Housing Designation | Housing rupture load in load direction F  |       |       |       |       | Connecting screws |   |      |      |
|---------------------|---|-------|-------|-------|-------|-------------------|---|------|------|
|                     | Housing made from flake graphite cast iron (suffix L)<br>For housings made from spheroidal graphite cast iron (suffix D), multiply the stated values by 1,6 |       |       |       |       | Thread to DIN 13  | Maximum load carrying capacity of both screws with contact between parting surfaces in load direction |      |      |
|                     | 55° kN  | 90°   | 120°  | 150°  | 180°  | Material 8.8      | 120° kN   | 150° | 180° |
| S3044               | 1 700   | 1 020 | 765   | 680   | 850   | M30               | 640   | 370  | 320  |
| S3048               | 1 900   | 1 130 | 845   | 750   | 940   | M30               | 640   | 370  | 320  |
| S3052               | 2 200   | 1 320 | 990   | 880   | 1 100 | M36               | 800   | 460  | 400  |
| S3056               | 2 500   | 1 500 | 1 120 | 1 000 | 1 300 | M36               | 800   | 460  | 400  |
| S3060               | 2 700   | 1 620 | 1 215 | 1 080 | 1 350 | M36               | 800   | 460  | 400  |
| S3064               | 2 900   | 1 740 | 1 305 | 1 160 | 1 450 | M36               | 800   | 460  | 400  |
| S3068               | 3 200   | 1 920 | 1 440 | 1 280 | 1 600 | M36               | 800   | 460  | 400  |
| S3072               | 3 500   | 2 100 | 1 575 | 1 400 | 1 750 | M36               | 800   | 460  | 400  |
| S3076               | 3 900   | 2 340 | 1 755 | 1 560 | 1 950 | M36               | 800   | 460  | 400  |
| S3080               | 4 300   | 2 580 | 1 935 | 1 720 | 2 150 | M36               | 800   | 460  | 400  |
| S3084               | 4 900   | 2 940 | 2 205 | 1 960 | 2 450 | M36               | 800   | 460  | 400  |
| S3088               | 5 300   | 3 180 | 2 385 | 2 120 | 2 650 | M36               | 800   | 460  | 400  |
| S3092               | 6 100   | 3 660 | 2 745 | 2 440 | 3 050 | M48               | 1 340   | 770  | 670  |
| S3096               | 7 000   | 4 200 | 3 150 | 2 800 | 3 500 | M48               | 1 340   | 770  | 670  |



# Bearing housings

## Housings SD31



*Figure 52*  
Guide values for the rupture load of housings SD31 and the maximum load carrying capacity of the connecting screws (tightening torques, see also page 947)

| Housing Designation | Housing rupture load in load direction F  |       |       |       |       | Connecting screws |   |       |       |
|---------------------|---|-------|-------|-------|-------|-------------------|---|-------|-------|
|                     | Housing made from flake graphite cast iron (suffix L)<br>For housings made from spheroidal graphite cast iron (suffix D), multiply the stated values by 1,6 |       |       |       |       | Thread to DIN 13  | Maximum load carrying capacity of the four screws with contact between parting surfaces in load direction |       |       |
|                     | 55°<br>kN   | 90°   | 120°  | 150°  | 180°  | Material 8.8      | 120°<br>kN  | 150°  | 180°  |
| SD3138              | 3 000   | 1 350 | 1 150 | 1 100 | 1 200 | M20               | 520   | 300   | 260   |
| SD3140              | 4 000   | 1 700 | 1 450 | 1 400 | 1 600 | M24               | 720   | 420   | 360   |
| SD3144              | 4 250   | 1 900 | 1 600 | 1 500 | 1 700 | M24               | 720   | 420   | 360   |
| SD3148              | 4 600   | 2 300 | 1 800 | 1 600 | 1 850 | M24               | 720   | 420   | 360   |
| SD3152              | 5 500   | 2 550 | 2 150 | 2 050 | 2 200 | M30               | 1 280   | 740   | 640   |
| SD3156              | 6 600   | 3 100 | 2 400 | 2 250 | 2 650 | M30               | 1 280   | 740   | 640   |
| SD3160              | 7 750   | 3 400 | 2 900 | 2 800 | 3 100 | M30               | 1 280   | 740   | 640   |
| SD3164              | 8 100   | 3 650 | 3 100 | 3 000 | 3 250 | M30               | 1 280   | 740   | 640   |
| SD3168              | 8 850   | 4 000 | 3 200 | 3 100 | 3 550 | M30               | 1 280   | 740   | 640   |
| SD3172              | 9 750   | 4 500 | 3 350 | 3 250 | 3 900 | M30               | 1 280   | 740   | 640   |
| SD3176              | 10 300  | 4 800 | 3 400 | 3 300 | 4 150 | M30               | 1 280   | 740   | 640   |
| SD3180              | 10 700  | 5 000 | 3 500 | 3 400 | 4 300 | M36               | 1 600   | 920   | 800   |
| SD3184              | 12 000  | 5 800 | 4 000 | 3 750 | 4 800 | M36               | 1 600   | 920   | 800   |
| SD3188              | 12 400  | 5 950 | 4 450 | 3 950 | 4 950 | M36               | 1 600   | 920   | 800   |
| SD3192              | 13 300  | 6 350 | 4 750 | 4 250 | 5 300 | M36               | 1 600   | 920   | 800   |
| SD3196              | 14 300  | 6 850 | 5 150 | 4 550 | 5 700 | M42               | 2 060   | 1 180 | 1 030 |

## **Load carrying capacity of unsplit plummer block housings**

The permissible load on the housing is dependent on the strength of the housing, the load carrying capacity of the bearing and on the load direction. Guide values for the rupture load of housings BND are given in the following table, page 946.

Values for other unsplit housings are available by agreement.

When determining the permissible load, safety factors must be applied. For general machine building, a safety factor of 6 relative to the housing rupture load is normally applied.

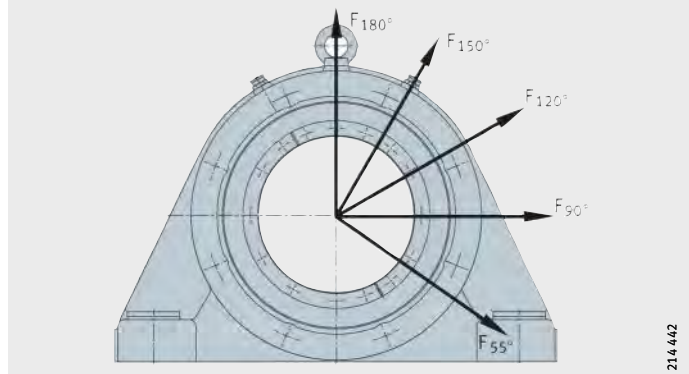
The values in the tables apply if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H.

A precondition for supporting loads is that the housing base surface is completely and rigidly supported.



# Bearing housings

## Housings BND



*Figure 53*  
Guide values for the rupture load of housings BND made from cast steel and spheroidal graphite cast iron

| Housing Designation |         |         |         | Housing rupture load in load direction F |        |        |        |        |
|---------------------|---------|---------|---------|--|--------|--------|--------|--------|
|                     |         |         |         | 55°<br>kN                                | 90°    | 120°   | 150°   | 180°   |
| BND2236             | –       | –       | –       | 4 435                                    | 3 570  | 3 470  | 2 755  | 3 470  |
| BND2238             | BND3044 | –       | –       | 4 435                                    | 3 570  | 3 470  | 2 755  | 3 470  |
| –                   | –       | BND3138 | BND3236 | 4 590                                    | 3 725  | 2 140  | 1 715  | 2 140  |
| –                   | –       | BND3140 | BND3238 | 5 610                                    | 4 540  | 2 295  | 1 835  | 2 295  |
| BND2240             | BND3048 | –       | –       | 5 050                                    | 4 030  | 4 895  | 3 875  | 4 895  |
| –                   | –       | BND3144 | BND3240 | 6 120                                    | 4 935  | 2 550  | 2 040  | 2 550  |
| BND2244             | BND3052 | –       | –       | 5 660                                    | 4 540  | 5 000  | 3 980  | 5 000  |
| –                   | BND3056 | –       | –       | 6 580                                    | 5 255  | 6 120  | 4 895  | 6 120  |
| –                   | –       | BND3148 | BND3244 | 6 835                                    | 5 510  | 3 060  | 2 450  | 3 060  |
| BND2248             | BND3060 | –       | –       | 7 295                                    | 5 815  | 6 325  | 5 100  | 6 325  |
| –                   | –       | BND3152 | BND3248 | 7 650                                    | 6 170  | 3 570  | 2 855  | 3 570  |
| BND2252             | BND3064 | –       | –       | 8 000                                    | 6 425  | 6 835  | 5 400  | 6 835  |
| –                   | –       | BND3156 | BND3252 | 9 385                                    | 7 550  | 4 180  | 3 365  | 4 180  |
| BND2256             | BND3068 | –       | –       | 8 825                                    | 7 040  | 6 835  | 5 400  | 6 835  |
| –                   | –       | BND3160 | BND3256 | 10 200                                   | 8 260  | 4 490  | 3 570  | 4 490  |
| BND2260             | BND3072 | –       | –       | 9 640                                    | 7 700  | 8 160  | 6 530  | 8 160  |
| –                   | BND3076 | –       | –       | 10 810                                   | 8 670  | 8 365  | 8 770  | 8 365  |
| –                   | –       | BND3164 | BND3260 | 11 935                                   | 9 535  | 5 100  | 4 080  | 5 100  |
| BND2264             | BND3080 | –       | –       | 12 035                                   | 9 690  | 9 080  | 7 240  | 9 080  |
| –                   | –       | BND3168 | BND3264 | 14 280                                   | 11 375 | 5 815  | 4 590  | 5 815  |
| BND2268             | BND3084 | –       | –       | 13 360                                   | 10 760 | 9 280  | 7 345  | 9 280  |
| –                   | –       | BND3172 | –       | 14 485                                   | 11 630 | 6 630  | 5 300  | 6 630  |
| BND2272             | –       | –       | –       | 15 700                                   | 12 570 | 10 370 | 8 325  | 10 370 |
| –                   | –       | BND3176 | BND3268 | 16 320                                   | 13 055 | 6 630  | 5 300  | 6 630  |
| BND2276             | –       | –       | –       | 16 600                                   | 13 280 | 10 960 | 8 800  | 10 960 |
| –                   | –       | BND3180 | BND3272 | 17 850                                   | 14 280 | 7 345  | 5 815  | 7 345  |
| BND2280             | –       | –       | –       | 19 750                                   | 15 800 | 13 030 | 10 470 | 13 030 |
| –                   | –       | –       | BND3276 | 18 870                                   | 15 050 | 8 160  | 6 530  | 8 160  |
| –                   | –       | BND3184 | –       | 19 380                                   | 15 600 | 8 160  | 6 530  | 8 160  |
| BND2284             | –       | –       | –       | 21 540                                   | 17 240 | 14 220 | 11 420 | 14 220 |
| –                   | –       | –       | BND3280 | 22 440                                   | 17 950 | 9 280  | 7 445  | 9 280  |
| –                   | –       | –       | BND3284 | 24 480                                   | 19 380 | 10 710 | 8 570  | 10 710 |

## Tightening torques

The tightening torques in the following table are maximum values for metric coarse-pitch threads to DIN 13-13 and head contact dimensions to DIN 912, 931, 933, 934, 6 912, 7 984 and 7 990.

They are valid with 90% utilisation of the yield stress of the screw material 8.8 and a friction factor of 0,14. We recommend that the screws should be tightened to 70% of these values. Housings are not supplied together with screws for the housing base.

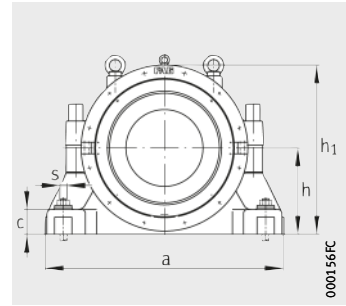
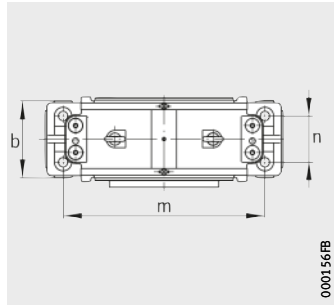
### Maximum tightening torques for screws with metric thread to DIN 13-13

| Nominal screw size | Tightening torque<br>Nm |
|--------------------|-------------------------|
| M16                | 215                     |
| M20                | 430                     |
| M24                | 740                     |
| M30                | 1 450                   |
| M36                | 2 600                   |
| M42                | 4 000                   |
| M45                | 4 950                   |
| M48                | 6 000                   |
| M56                | 9 650                   |
| M64                | 14 400                  |
| M72                | 21 100                  |
| M80                | 29 300                  |
| M90                | 42 500                  |
| M100               | 59 200                  |



# Plummer block housings

KPG, split  
For spherical roller bearings with tapered bore and sleeve, for split spherical roller bearings

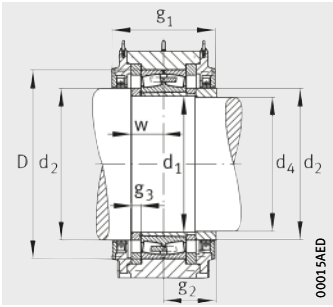


**Dimension table** - Dimensions in mm

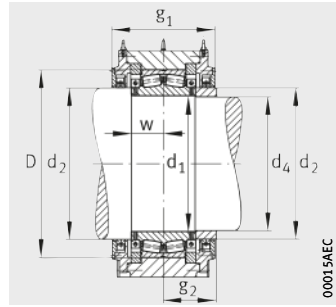
Designation<sup>1)</sup>

| Housing               |                       | Bearing          |                         | Sleeve      |
|-----------------------|-----------------------|------------------|-------------------------|-------------|
| Locating bearing      | Non-locating bearing  | MB cage          | Pin cage                |             |
| <b>KPG49/470-F-S</b>  | <b>KPG49/470-L-S</b>  | Z-528741.PRL-K30 | Z-541821.249/500-K30    | Z-524974.KH |
| <b>KPG49/500-F-S</b>  | <b>KPG49/500-L-S</b>  | Z-528742.PRL-K30 | Z-541822.249/530-K30    | Z-524976.KH |
| <b>KPG49/530-F-S</b>  | <b>KPG49/530-L-S</b>  | Z-528743.PRL-K30 | Z-541823.249/560-B-K30  | Z-524978.KH |
| <b>KPG49/570-F-S</b>  | <b>KPG49/570-L-S</b>  | Z-528744.PRL-K30 | Z-541824.249/600-B-K30  | Z-524980.KH |
| <b>KPG49/600-F-S</b>  | <b>KPG49/600-L-S</b>  | -                | Z-541825.249/630-K30    | Z-524982.KH |
| <b>KPG49/630-F-S</b>  | <b>KPG49/630-L-S</b>  | Z-528746.PRL-K30 | Z-541826.249/670-K30    | Z-524984.KH |
| <b>KPG49/670-F-S</b>  | <b>KPG49/670-L-S</b>  | Z-528747.PRL-K30 | Z-541827.249/710-B-K30  | Z-524986.KH |
| <b>KPG49/710-F-S</b>  | <b>KPG49/710-L-S</b>  | Z-528748.PRL-K30 | Z-541828.249/750-B-K30  | Z-524988.KH |
| <b>KPG49/750-F-S</b>  | <b>KPG49/750-L-S</b>  | Z-528749.PRL-K30 | Z-541829.249/800-B-K30  | Z-524990.KH |
| <b>KPG49/800-F-S</b>  | <b>KPG49/800-L-S</b>  | Z-528750.PRL-K30 | Z-541830.249/850-B-K30  | Z-524992.KH |
| <b>KPG49/850-F-S</b>  | <b>KPG49/850-L-S</b>  | Z-528751.PRL-K30 | Z-541831.249/900-B-K30  | Z-524994.KH |
| <b>KPG49/900-F-S</b>  | <b>KPG49/900-L-S</b>  | Z-528752.PRL-K30 | Z-541832.249/950-B-K30  | Z-524996.KH |
| <b>KPG49/950-F-S</b>  | <b>KPG49/950-L-S</b>  | Z-528753.PRL-K30 | Z-541833.249/1000-B-K30 | Z-524998.KH |
| <b>KPG49/1000-F-S</b> | <b>KPG49/1000-L-S</b> | -                | Z-541834.249/1060-B-K30 | Z-525000.KH |
| <b>KPG49/1060-F-S</b> | <b>KPG49/1060-L-S</b> | -                | Z-541835.249/1120-B-K30 | Z-525001.KH |
| <b>KPG49/1120-F-S</b> | <b>KPG49/1120-L-S</b> | -                | Z-541836.249/1180-B-K30 | Z-525003.KH |
| <b>KPG49/1180-F-S</b> | <b>KPG49/1180-L-S</b> | -                | Z-541837.249/1250-B-K30 | Z-525005.KH |
| <b>KPG49/1250-F-S</b> | <b>KPG49/1250-L-S</b> | -                | Z-541838.249/1320-B-K30 | Z-525007.KH |

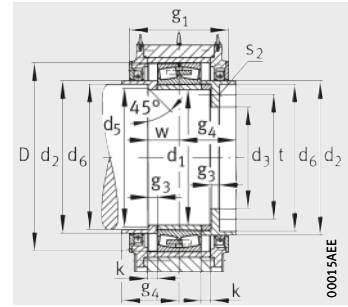
<sup>1)</sup> Ordering example:  
Housing KPG49/1000-F-S (see also page 911),  
bearing with pin cage Z-541834.249/1060-B-K30 (see bearing tables),  
sleeve Z-525000.KH (see bearing tables).



KPG49..-F (unsplit bearing)  
Locating bearing



KPG49..-F (split bearing)  
Locating bearing



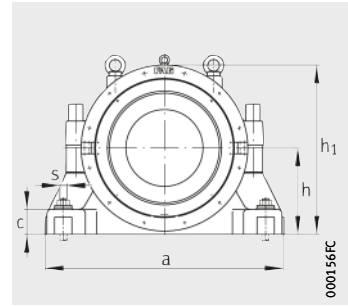
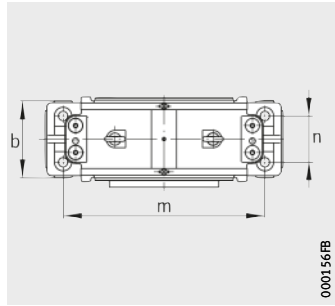
KPG49..-L (unsplit bearing)  
Non-locating bearing

| Split bearing   | Initial grease filling quantity |              |                             | Mass<br>m<br>Housing<br>≈kg |
|-----------------|---------------------------------|--------------|-----------------------------|-----------------------------|
|                 | Locating bearing                |              | Non-locating bearing<br>≈kg |                             |
|                 | Unsplit<br>≈kg                  | Split<br>≈kg |                             |                             |
| Z-529173.PRL    | 10                              | 8            | 14                          | 945                         |
| Z-528441.PRL    | 10                              | 8            | 14                          | 1 050                       |
| Z-529223.PRL    | 13                              | 10           | 15                          | 1 365                       |
| Z-529224.PRL    | 15                              | 12           | 20                          | 1 575                       |
| Z-529225.PRL    | 20                              | 15           | 24                          | 2 205                       |
| Z-529226.PRL    | 22                              | 18           | 25                          | 2 625                       |
| Z-529227.PRL    | 26                              | 20           | 30                          | 2 835                       |
| Z-527943.PRL    | 30                              | 24           | 35                          | 2 940                       |
| Z-529228.PRL    | 35                              | 26           | 40                          | 3 465                       |
| Z-529229.PRL    | 40                              | 30           | 50                          | 3 885                       |
| Z-529230.PRL    | 45                              | 35           | 55                          | 4 515                       |
| Z-527254.PRL    | 55                              | 45           | 65                          | 5 460                       |
| Z-529231.PRL    | 65                              | 50           | 80                          | 5 660                       |
| Z-529232.PRL    | 75                              | 60           | 95                          | 7 140                       |
| Z-529233.01.PRL | 80                              | 65           | 100                         | 8 400                       |
| Z-529234.PRL    | 95                              | 75           | 110                         | 9 450                       |
| –               | 110                             | –            | 130                         | 11 550                      |
| Z-529215.PRL    | 125                             | 100          | 170                         | 13 440                      |



# Plummer block housings

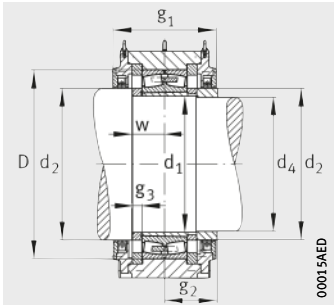
KPG, split  
 For spherical roller bearings with tapered bore and sleeve, for split spherical roller bearings



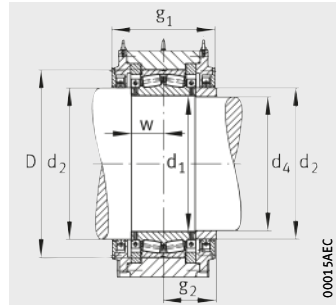
**Dimension table** (continued) · Dimensions in mm

| Designation           |                       | Dimensions     |       |                |                |     |     |       |                |                |                |                |
|-----------------------|-----------------------|----------------|-------|----------------|----------------|-----|-----|-------|----------------|----------------|----------------|----------------|
| Housing               |                       | d <sub>1</sub> | a     | g <sub>1</sub> | h <sub>1</sub> | b   | c   | D     | d <sub>2</sub> | d <sub>3</sub> | d <sub>5</sub> | d <sub>6</sub> |
| Locating bearing      | Non-locating bearing  |                |       |                |                |     |     |       |                |                |                |                |
| <b>KPG49/470-F-S</b>  | <b>KPG49/470-L-S</b>  | <b>470</b>     | 1 170 | 400            | 820            | 375 | 130 | 670   | 540            | 375            | 480            | 505            |
| <b>KPG49/500-F-S</b>  | <b>KPG49/500-L-S</b>  | <b>500</b>     | 1 240 | 410            | 875            | 400 | 140 | 710   | 570            | 400            | 510            | 535            |
| <b>KPG49/530-F-S</b>  | <b>KPG49/530-L-S</b>  | <b>530</b>     | 1 320 | 420            | 930            | 420 | 145 | 750   | 600            | 420            | 540            | 565            |
| <b>KPG49/570-F-S</b>  | <b>KPG49/570-L-S</b>  | <b>570</b>     | 1 400 | 460            | 980            | 440 | 155 | 800   | 645            | 450            | 580            | 610            |
| <b>KPG49/600-F-S</b>  | <b>KPG49/600-L-S</b>  | <b>600</b>     | 1 500 | 480            | 1 040          | 480 | 165 | 850   | 675            | 475            | 612            | 640            |
| <b>KPG49/630-F-S</b>  | <b>KPG49/630-L-S</b>  | <b>630</b>     | 1 570 | 500            | 1 110          | 500 | 175 | 900   | 720            | 505            | 642            | 675            |
| <b>KPG49/670-F-S</b>  | <b>KPG49/670-L-S</b>  | <b>670</b>     | 1 660 | 560            | 1 170          | 535 | 185 | 950   | 760            | 535            | 682            | 715            |
| <b>KPG49/710-F-S</b>  | <b>KPG49/710-L-S</b>  | <b>710</b>     | 1 750 | 590            | 1 240          | 550 | 195 | 1 000 | 800            | 565            | 722            | 755            |
| <b>KPG49/750-F-S</b>  | <b>KPG49/750-L-S</b>  | <b>750</b>     | 1 850 | 600            | 1 310          | 570 | 205 | 1 060 | 860            | 600            | 762            | 805            |
| <b>KPG49/800-F-S</b>  | <b>KPG49/800-L-S</b>  | <b>800</b>     | 1 960 | 630            | 1 390          | 600 | 220 | 1 120 | 910            | 640            | 812            | 855            |
| <b>KPG49/850-F-S</b>  | <b>KPG49/850-L-S</b>  | <b>850</b>     | 2 060 | 660            | 1 450          | 620 | 230 | 1 180 | 960            | 675            | 862            | 905            |
| <b>KPG49/900-F-S</b>  | <b>KPG49/900-L-S</b>  | <b>900</b>     | 2 200 | 680            | 1 550          | 660 | 250 | 1 250 | 1 015          | 715            | 915            | 960            |
| <b>KPG49/950-F-S</b>  | <b>KPG49/950-L-S</b>  | <b>950</b>     | 2 330 | 720            | 1 620          | 650 | 255 | 1 320 | 1 065          | 750            | 965            | 1 010          |
| <b>KPG49/1000-F-S</b> | <b>KPG49/1000-L-S</b> | <b>1 000</b>   | 2 450 | 780            | 1 710          | 740 | 275 | 1 400 | 1 135          | 795            | 1 015          | 1 070          |
| <b>KPG49/1060-F-S</b> | <b>KPG49/1060-L-S</b> | <b>1 060</b>   | 2 560 | 800            | 1 780          | 740 | 285 | 1 460 | 1 195          | 840            | 1 075          | 1 130          |
| <b>KPG49/1120-F-S</b> | <b>KPG49/1120-L-S</b> | <b>1 120</b>   | 2 700 | 820            | 1 880          | 780 | 300 | 1 540 | 1 260          | 885            | 1 135          | 1 190          |
| <b>KPG49/1180-F-S</b> | <b>KPG49/1180-L-S</b> | <b>1 180</b>   | 2 850 | 850            | 1 985          | 820 | 320 | 1 630 | 1 330          | 940            | 1 195          | 1 255          |
| <b>KPG49/1250-F-S</b> | <b>KPG49/1250-L-S</b> | <b>1 250</b>   | 3 000 | 900            | 2 100          | 850 | 340 | 1 720 | 1 400          | 990            | 1 265          | 1 325          |

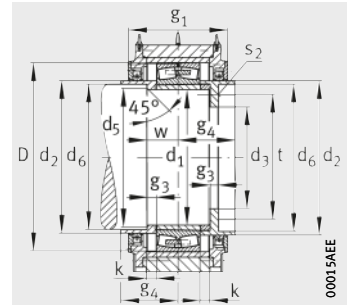




KPG49..-F (unsplit bearing)  
Locating bearing



KPG49..-F (split bearing)  
Locating bearing



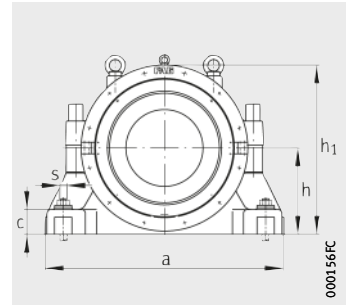
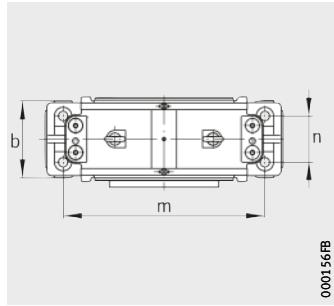
KPG49..-L (unsplit bearing)  
Non-locating bearing

| g <sub>2</sub> | g <sub>3</sub> | g <sub>4</sub> | h    | k  | m    | n   | s    | t      | s <sub>2</sub> |          | w   |
|----------------|----------------|----------------|------|----|------|-----|------|--------|----------------|----------|-----|
|                |                |                |      |    |      |     |      |        | DIN 931        | Quantity |     |
| 210            | 40             | 230            | 425  | 40 | 975  | 230 | M42  | 437,5  | M20X70         | 8        | 125 |
| 215            | 40             | 235            | 450  | 40 | 1050 | 240 | M42  | 465    | M20X70         | 8        | 130 |
| 220            | 40             | 240            | 475  | 40 | 1100 | 255 | M48  | 490    | M20X70         | 8        | 135 |
| 240            | 45             | 260            | 500  | 40 | 1150 | 270 | M52  | 525    | M20X80         | 8        | 145 |
| 250            | 46             | 270            | 535  | 40 | 1225 | 295 | M56  | 552,5  | M20X80         | 8        | 155 |
| 260            | 50             | 280            | 570  | 40 | 1300 | 310 | M56  | 587,5  | M24X90         | 8        | 165 |
| 290            | 53,5           | 317,5          | 600  | 50 | 1375 | 325 | M64  | 622,5  | M24X90         | 8        | 175 |
| 305            | 55             | 332,5          | 630  | 50 | 1450 | 335 | M64  | 657,5  | M30X100        | 8        | 180 |
| 310            | 56             | 337,5          | 670  | 50 | 1550 | 345 | M72  | 700    | M30X100        | 8        | 185 |
| 325            | 59             | 352,5          | 710  | 50 | 1600 | 360 | M72  | 745    | M30X110        | 8        | 195 |
| 340            | 60             | 375            | 740  | 60 | 1700 | 370 | M80  | 787,5  | M30X110        | 8        | 200 |
| 350            | 60             | 385            | 800  | 60 | 1820 | 390 | M90  | 832,5  | M36X110        | 8        | 210 |
| 370            | 72,5           | 412,5          | 830  | 70 | 1980 | 360 | M90  | 875    | M36X130        | 8        | 230 |
| 400            | 77,5           | 435            | 880  | 60 | 2000 | 460 | M100 | 927,5  | M36X130        | 8        | 245 |
| 410            | 77,5           | 452,5          | 920  | 70 | 2150 | 460 | M100 | 980    | M42X140        | 8        | 245 |
| 420            | 82,5           | 462,5          | 970  | 70 | 2300 | 480 | M110 | 1032,5 | M42X140        | 8        | 260 |
| 435            | 87,5           | 477,5          | 1010 | 70 | 2400 | 510 | M110 | 1095   | M42X150        | 8        | 275 |
| 460            | 90             | 502,5          | 1080 | 70 | 2500 | 520 | M125 | 1155   | M48X180        | 8        | 290 |



# Plummer block housings

KPGZ, split  
 For spherical roller bearings with cylindrical bore,  
 for split spherical roller bearings

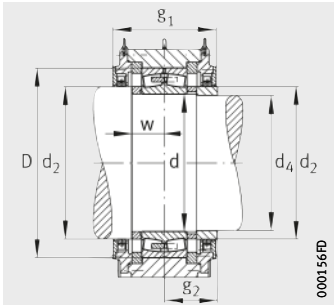


**Dimension table** - Dimensions in mm

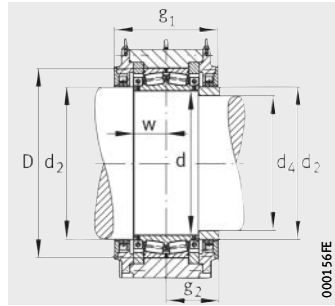
Designation<sup>1)</sup>

| Housing                |                        | Bearing      |                     |                 |
|------------------------|------------------------|--------------|---------------------|-----------------|
| Locating bearing       | Non-locating bearing   | MB cage      | Pin cage            | Split           |
| <b>KPGZ49/500-F-S</b>  | <b>KPGZ49/500-L-S</b>  | Z-528741.PRL | Z-541821.249/500    | Z-537276.PRL    |
| <b>KPGZ49/530-F-S</b>  | <b>KPGZ49/530-L-S</b>  | Z-528742.PRL | Z-541822.249/530    | Z-537277.PRL    |
| <b>KPGZ49/560-F-S</b>  | <b>KPGZ49/560-L-S</b>  | Z-528743.PRL | Z-541823.249/560-B  | Z-537278.PRL    |
| <b>KPGZ49/600-F-S</b>  | <b>KPGZ49/600-L-S</b>  | Z-528744.PRL | Z-541824.249/600-B  | Z-533761.PRL    |
| <b>KPGZ49/630-F-S</b>  | <b>KPGZ49/630-L-S</b>  | –            | Z-541825.249/630    | Z-537279.PRL    |
| <b>KPGZ49/670-F-S</b>  | <b>KPGZ49/670-L-S</b>  | Z-528746.PRL | Z-541826.249/670-B  | Z-537280.PRL    |
| <b>KPGZ49/710-F-S</b>  | <b>KPGZ49/710-L-S</b>  | Z-528747.PRL | Z-541827.249/710-B  | Z-526073.PRL    |
| <b>KPGZ49/750-F-S</b>  | <b>KPGZ49/750-L-S</b>  | Z-528748.PRL | Z-541828.249/750-B  | Z-533414.01.PRL |
| <b>KPGZ49/800-F-S</b>  | <b>KPGZ49/800-L-S</b>  | Z-528749.PRL | Z-541829.249/800-B  | Z-532063.PRL    |
| <b>KPGZ49/850-F-S</b>  | <b>KPGZ49/850-L-S</b>  | Z-528750.PRL | Z-541830.249/850-B  | Z-537281.PRL    |
| <b>KPGZ49/900-F-S</b>  | <b>KPGZ49/900-L-S</b>  | Z-528751.PRL | Z-541831.249/900-B  | Z-537282.PRL    |
| <b>KPGZ49/950-F-S</b>  | <b>KPGZ49/950-L-S</b>  | Z-528752.PRL | Z-541832.249/950-B  | Z-534826.PRL    |
| <b>KPGZ49/1000-F-S</b> | <b>KPGZ49/1000-L-S</b> | Z-528753.PRL | Z-541833.249/1000-B | Z-533567.PRL    |
| <b>KPGZ49/1060-F-S</b> | <b>KPGZ49/1060-L-S</b> | –            | Z-541834.249/1060-B | Z-537283.PRL    |
| <b>KPGZ49/1120-F-S</b> | <b>KPGZ49/1120-L-S</b> | –            | Z-541835.249/1120-B | Z-537284.PRL    |
| <b>KPGZ49/1180-F-S</b> | <b>KPGZ49/1180-L-S</b> | –            | Z-541836.249/1180-B | Z-536806.PRL    |
| <b>KPGZ49/1250-F-S</b> | <b>KPGZ49/1250-L-S</b> | –            | Z-541837.249/1250-B | Z-537285.PRL    |
| <b>KPGZ49/1320-F-S</b> | <b>KPGZ49/1320-L-S</b> | –            | Z-541838.249/1320-B | Z-545161.PRL    |

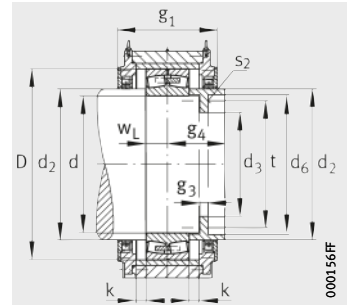
<sup>1)</sup> Ordering example:  
 Housing KPGZ49/1000-F-S (see also page 912),  
 split bearing Z-533567.PRL (see bearing tables).



KPGZ49..-F (unsplit bearing)  
Locating bearing



KPGZ49..-F (split bearing)  
Locating bearing



KPGZ49..-L (unsplit bearing)  
Non-locating bearing

Initial grease filling quantity

Locating bearing

Unsplit

≈kg

Split

≈kg

Non-locating bearing

≈kg

Mass  
m

Housing

≈kg

10

8

14

900

10

8

14

1 000

13

10

15

1 300

15

12

20

1 500

20

15

24

2 100

22

18

25

2 500

26

20

30

2 700

30

24

35

2 800

35

26

40

3 300

40

30

50

3 700

45

35

55

4 300

55

45

65

5 200

65

50

80

5 770

75

60

95

6 800

80

65

100

8 000

95

75

110

9 000

110

85

130

11 000

125

100

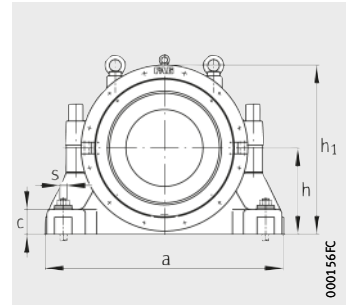
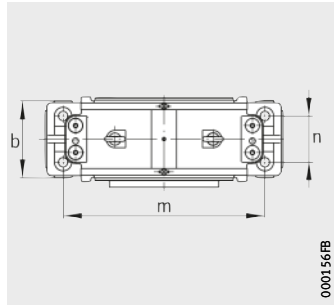
170

12 800



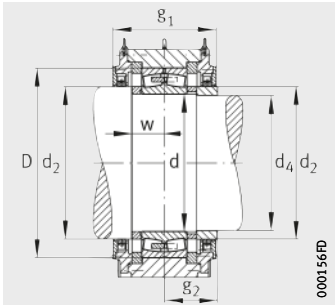
# Plummer block housings

KPGZ, split  
 For spherical roller bearings with cylindrical bore,  
 for split spherical roller bearings

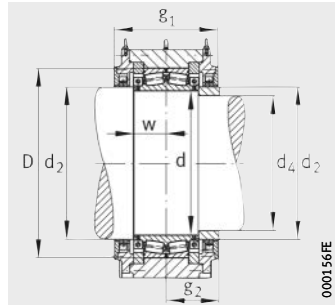


**Dimension table** (continued) · Dimensions in mm

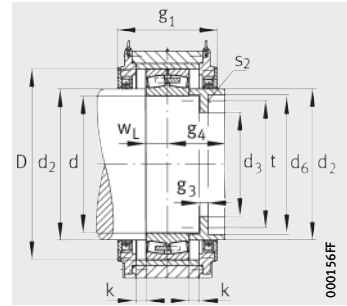
| Designation      |                      | Dimensions |       |                |                |     |     |       |                |                |                |                |
|------------------|----------------------|------------|-------|----------------|----------------|-----|-----|-------|----------------|----------------|----------------|----------------|
| Housing          |                      | d          | a     | g <sub>1</sub> | h <sub>1</sub> | b   | c   | D     | d <sub>2</sub> | d <sub>3</sub> | d <sub>4</sub> | d <sub>5</sub> |
| Locating bearing | Non-locating bearing |            |       |                |                |     |     |       |                |                |                |                |
| KPGZ49/500-F-S   | KPGZ49/500-L-S       | 500        | 1 170 | 400            | 820            | 375 | 130 | 670   | 540            | 375            | 495            | 510            |
| KPGZ49/530-F-S   | KPGZ49/530-L-S       | 530        | 1 240 | 410            | 875            | 400 | 140 | 710   | 570            | 400            | 525            | 540            |
| KPGZ49/560-F-S   | KPGZ49/560-L-S       | 560        | 1 320 | 420            | 930            | 420 | 145 | 750   | 600            | 420            | 555            | 570            |
| KPGZ49/600-F-S   | KPGZ49/600-L-S       | 600        | 1 400 | 460            | 980            | 440 | 155 | 800   | 645            | 450            | 595            | 610            |
| KPGZ49/630-F-S   | KPGZ49/630-L-S       | 630        | 1 500 | 480            | 1 040          | 480 | 165 | 850   | 675            | 475            | 625            | 642            |
| KPGZ49/670-F-S   | KPGZ49/670-L-S       | 670        | 1 570 | 500            | 1 110          | 500 | 175 | 900   | 720            | 505            | 665            | 682            |
| KPGZ49/710-F-S   | KPGZ49/710-L-S       | 710        | 1 660 | 560            | 1 170          | 535 | 185 | 950   | 760            | 535            | 695            | 722            |
| KPGZ49/750-F-S   | KPGZ49/750-L-S       | 750        | 1 750 | 590            | 1 240          | 550 | 195 | 1 000 | 800            | 565            | 745            | 762            |
| KPGZ49/800-F-S   | KPGZ49/800-L-S       | 800        | 1 850 | 600            | 1 310          | 570 | 205 | 1 060 | 860            | 600            | 795            | 812            |
| KPGZ49/850-F-S   | KPGZ49/850-L-S       | 850        | 1 960 | 630            | 1 390          | 600 | 220 | 1 120 | 910            | 640            | 845            | 862            |
| KPGZ49/900-F-S   | KPGZ49/900-L-S       | 900        | 2 060 | 660            | 1 450          | 620 | 230 | 1 180 | 960            | 675            | 895            | 912            |
| KPGZ49/950-F-S   | KPGZ49/950-L-S       | 950        | 2 200 | 680            | 1 550          | 660 | 250 | 1 250 | 1 015          | 715            | 945            | 965            |
| KPGZ49/1000-F-S  | KPGZ49/1000-L-S      | 1 000      | 2 330 | 720            | 1 620          | 650 | 255 | 1 320 | 1 065          | 750            | 985            | 1 015          |
| KPGZ49/1060-F-S  | KPGZ49/1060-L-S      | 1 060      | 2 450 | 780            | 1 710          | 740 | 275 | 1 400 | 1 135          | 795            | 1 055          | 1 075          |
| KPGZ49/1120-F-S  | KPGZ49/1120-L-S      | 1 120      | 2 560 | 800            | 1 780          | 740 | 285 | 1 460 | 1 195          | 840            | 1 115          | 1 135          |
| KPGZ49/1180-F-S  | KPGZ49/1180-L-S      | 1 180      | 2 700 | 820            | 1 880          | 780 | 300 | 1 540 | 1 260          | 885            | 1 175          | 1 195          |
| KPGZ49/1250-F-S  | KPGZ49/1250-L-S      | 1 250      | 2 850 | 850            | 1 985          | 820 | 320 | 1 630 | 1 330          | 940            | 1 245          | 1 265          |
| KPGZ49/1320-F-S  | KPGZ49/1320-L-S      | 1 320      | 3 000 | 900            | 2 100          | 850 | 340 | 1 720 | 1 400          | 990            | 1 315          | 1 335          |



KPGZ49..-F (unsplit bearing)  
Locating bearing



KPGZ49..-F (split bearing)  
Locating bearing



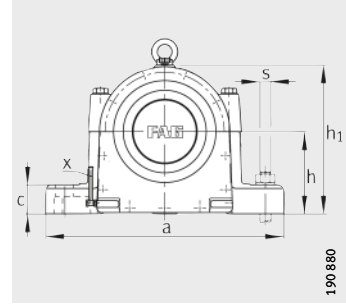
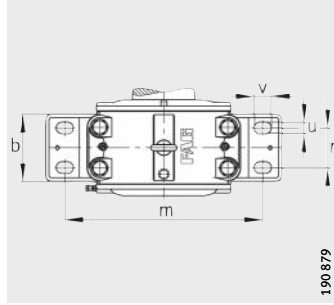
KPGZ49..-L (unsplit bearing)  
Non-locating bearing

| d <sub>6</sub> | g <sub>2</sub> | g <sub>3</sub> | g <sub>4</sub> | h     | k  | m     | n   | s    | t       | s <sub>2</sub> |          | w     | w <sub>L</sub> |
|----------------|----------------|----------------|----------------|-------|----|-------|-----|------|---------|----------------|----------|-------|----------------|
|                |                |                |                |       |    |       |     |      |         | DIN 931        | Quantity |       |                |
| 505            | 210            | 40             | 230            | 425   | 40 | 975   | 230 | M42  | 437,5   | M20X70         | 8        | 125   | 85             |
| 535            | 215            | 40             | 235            | 450   | 40 | 1 050 | 240 | M42  | 465     | M20X70         | 8        | 130   | 90             |
| 565            | 220            | 40             | 240            | 475   | 40 | 1 100 | 255 | M48  | 490     | M20X70         | 8        | 135   | 95             |
| 610            | 240            | 45             | 260            | 500   | 40 | 1 150 | 270 | M52  | 525     | M20X80         | 8        | 145   | 100            |
| 640            | 250            | 46             | 270            | 535   | 40 | 1 225 | 295 | M56  | 552,5   | M20X80         | 8        | 155   | 109            |
| 675            | 260            | 47,5           | 280            | 570   | 40 | 1 300 | 310 | M56  | 587,5   | M24X90         | 8        | 162,5 | 115            |
| 715            | 290            | 53,5           | 317,5          | 600   | 50 | 1 375 | 325 | M64  | 622,5   | M24X90         | 8        | 175   | 121,5          |
| 755            | 305            | 52,5           | 332,5          | 630   | 50 | 1 450 | 335 | M64  | 657,5   | M30X100        | 8        | 177,5 | 125            |
| 805            | 310            | 56             | 337,5          | 670   | 50 | 1 550 | 345 | M72  | 700     | M30X100        | 8        | 185   | 129            |
| 855            | 325            | 56,5           | 352,5          | 710   | 50 | 1 600 | 360 | M72  | 745     | M30X110        | 8        | 192,5 | 136            |
| 905            | 340            | 55             | 375            | 740   | 60 | 1 700 | 370 | M80  | 787,5   | M30X110        | 8        | 195   | 140            |
| 960            | 350            | 55             | 385            | 800   | 60 | 1 820 | 390 | M90  | 832,5   | M36X110        | 8        | 205   | 150            |
| 1 010          | 370            | 67,5           | 412,5          | 830   | 70 | 1 980 | 360 | M90  | 875     | M36X130        | 8        | 225   | 157,5          |
| 1 070          | 400            | 70             | 435            | 880   | 60 | 2 000 | 460 | M100 | 927,5   | M36X130        | 8        | 237,5 | 167,5          |
| 1 130          | 410            | 70             | 452,5          | 920   | 70 | 2 150 | 460 | M100 | 980     | M42X140        | 8        | 237,5 | 167,5          |
| 1 190          | 420            | 72,5           | 462,5          | 970   | 70 | 2 300 | 480 | M110 | 1 032,5 | M42X140        | 8        | 250   | 177,5          |
| 1 255          | 435            | 85             | 477,5          | 1 010 | 70 | 2 400 | 510 | M110 | 1 095   | M42X150        | 8        | 272,5 | 187,5          |
| 1 325          | 460            | 90             | 502,5          | 1 080 | 70 | 2 500 | 520 | M125 | 1 155   | M48X180        | 8        | 290   | 200            |



# Plummer block housings

LOE, split  
For spherical roller bearings with cylindrical bore, oil lubrication

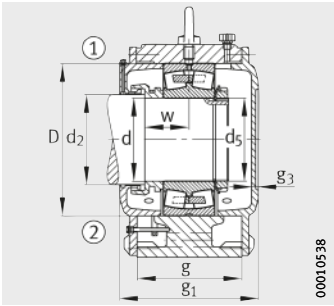


**Dimension table** - Dimensions in mm

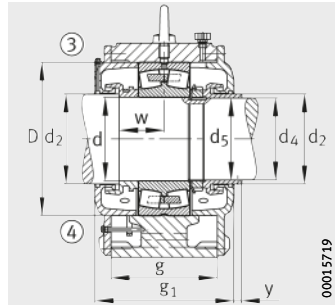
| Designation <sup>1)</sup> |                      |            |           |            | Initial oil filling quantity<br>l | Oil level<br>Height<br>x<br>mm | Mass<br>m<br>Housing<br>≈kg | Dimensions |     |
|---------------------------|----------------------|------------|-----------|------------|-----------------------------------|--------------------------------|-----------------------------|------------|-----|
| Housing                   |                      | Bearing    | Shaft nut | Tab washer |                                   |                                |                             | d          | a   |
| Locating bearing          | Non-locating bearing |            |           |            |                                   |                                |                             |            |     |
| <b>LOE330-N-AF-L</b>      | <b>LOE330-N-AL-L</b> | 22330-E1   | KM30      | MB30       | 6,2                               | 75-110                         | 200                         | <b>150</b> | 760 |
| <b>LOE330-N-BF-L</b>      | <b>LOE330-N-BL-L</b> | 22330-E1   | KM30      | MB30       | 6,2                               | 75-110                         | 200                         | <b>150</b> | 760 |
| <b>LOE332-N-AF-L</b>      | <b>LOE332-N-AL-L</b> | 22332-MB   | KM32      | MB32       | 7                                 | 80-105                         | 240                         | <b>160</b> | 820 |
| <b>LOE332-N-BF-L</b>      | <b>LOE332-N-BL-L</b> | 22332-MB   | KM32      | MB32       | 7                                 | 80-105                         | 240                         | <b>160</b> | 820 |
| <b>LOE334-N-AF-L</b>      | <b>LOE334-N-AL-L</b> | 22334-MB   | KM34      | MB34       | 7,2                               | 80-105                         | 270                         | <b>170</b> | 830 |
| <b>LOE334-N-BF-L</b>      | <b>LOE334-N-BL-L</b> | 22334-MB   | KM34      | MB34       | 7,2                               | 80-105                         | 270                         | <b>170</b> | 830 |
| <b>LOE236-N-AF-L</b>      | <b>LOE236-N-AL-L</b> | 22236-E1   | KM36      | MB36       | 6                                 | 75-110                         | 200                         | <b>180</b> | 710 |
| <b>LOE236-N-BF-L</b>      | <b>LOE236-N-BL-L</b> | 22236-E1   | KM36      | MB36       | 6                                 | 75-110                         | 200                         | <b>180</b> | 710 |
| <b>LOE336-N-AF-L</b>      | <b>LOE336-N-AL-L</b> | 22336-MB   | KM36      | MB36       | 7,4                               | 80-105                         | 330                         | <b>180</b> | 840 |
| <b>LOE336-N-BF-L</b>      | <b>LOE336-N-BL-L</b> | 22336-MB   | KM36      | MB36       | 7,4                               | 80-105                         | 330                         | <b>180</b> | 840 |
| <b>LOE238-N-AF-L</b>      | <b>LOE238-N-AL-L</b> | 22238-MB   | KM38      | MB38       | 7,2                               | 70-100                         | 230                         | <b>190</b> | 820 |
| <b>LOE238-N-BF-L</b>      | <b>LOE238-N-BL-L</b> | 22238-MB   | KM38      | MB38       | 7,2                               | 70-100                         | 230                         | <b>190</b> | 820 |
| <b>LOE240-N-AF-L</b>      | <b>LOE240-N-AL-L</b> | 22240-B-MB | KM40      | MB40       | 7,2                               | 75-100                         | 250                         | <b>200</b> | 830 |
| <b>LOE240-N-BF-L</b>      | <b>LOE240-N-BL-L</b> | 22240-B-MB | KM40      | MB40       | 7,2                               | 75-100                         | 250                         | <b>200</b> | 830 |
| <b>LOE244-N-AF-L</b>      | <b>LOE244-N-AL-L</b> | 22244-B-MB | HM44T     | MB44       | 8,2                               | 80-110                         | 310                         | <b>220</b> | 880 |
| <b>LOE244-N-BF-L</b>      | <b>LOE244-N-BL-L</b> | 22244-B-MB | HM44T     | MB44       | 8,2                               | 80-110                         | 310                         | <b>220</b> | 880 |
| <b>LOE248-N-AF-L</b>      | <b>LOE248-N-AL-L</b> | 22248-B-MB | HM48T     | MB48       | 8,4                               | 100-120                        | 385                         | <b>240</b> | 980 |
| <b>LOE248-N-BF-L</b>      | <b>LOE248-N-BL-L</b> | 22248-B-MB | HM48T     | MB48       | 8,4                               | 100-120                        | 385                         | <b>240</b> | 980 |

<sup>1)</sup> Ordering example:  
Housing LOE238-N-BF-L (see also page 913), bearing 22238-MB (see bearing tables), locknut KM38, tab washer MB38 (see dimension tables).

<sup>2)</sup> ① Locating bearing AF  
② Non-locating bearing AL  
③ Locating bearing BF  
④ Non-locating bearing BL



Design A  
①, ②<sup>2)</sup>



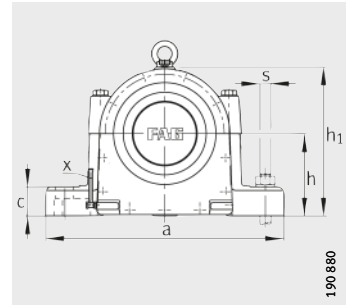
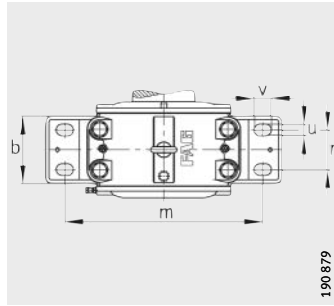
Design B  
③, ④<sup>2)</sup>

| $g_1$ | $h_1$ | $d_2$ | $d_4$ | $d_5$   | $w$ | $b$ | $c$ | $D$ | $g$ | $g_3$ | $h$ | $k$ | $m$ | $n$ | $u$ | $v$ | $s$ | $y$ |
|-------|-------|-------|-------|---------|-----|-----|-----|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| 335   | 465   | 160   | –     | M150X2  | 95  | 200 | 85  | 320 | 240 | 18    | 265 | 10  | 630 | 125 | 42  | 60  | M36 | –   |
| 335   | 465   | 160   | 147   | M150X2  | 95  | 200 | 85  | 320 | 240 | –     | 265 | 10  | 630 | 125 | 42  | 60  | M36 | 15  |
| 350   | 485   | 166   | –     | M160X3  | 100 | 240 | 90  | 340 | 250 | 20    | 270 | 10  | 670 | 130 | 48  | 70  | M42 | –   |
| 350   | 485   | 166   | 155   | M160X3  | 100 | 240 | 90  | 340 | 250 | –     | 270 | 10  | 670 | 130 | 48  | 70  | M42 | 15  |
| 350   | 510   | 180   | –     | M170X3  | 105 | 240 | 90  | 360 | 255 | 18    | 280 | 10  | 670 | 130 | 48  | 70  | M42 | –   |
| 350   | 510   | 180   | 165   | M170X3  | 105 | 240 | 90  | 360 | 255 | –     | 280 | 10  | 670 | 130 | 48  | 70  | M42 | 15  |
| 300   | 465   | 190   | –     | M180X3  | 90  | 200 | 85  | 320 | 210 | 20    | 260 | 10  | 580 | 110 | 42  | 60  | M36 | –   |
| 300   | 465   | 190   | 175   | M180X3  | 90  | 200 | 85  | 320 | 210 | –     | 260 | 10  | 580 | 110 | 42  | 60  | M36 | 22  |
| 360   | 530   | 190   | –     | M180X3  | 108 | 240 | 90  | 380 | 260 | 20    | 290 | 10  | 680 | 130 | 48  | 70  | M42 | –   |
| 360   | 530   | 190   | 175   | M180X3  | 108 | 240 | 90  | 380 | 260 | –     | 290 | 10  | 680 | 130 | 48  | 70  | M42 | 15  |
| 350   | 485   | 196   | –     | M190X3  | 95  | 240 | 90  | 340 | 250 | 20    | 270 | 10  | 670 | 130 | 48  | 70  | M42 | –   |
| 350   | 485   | 196   | 185   | M190X3  | 95  | 240 | 90  | 340 | 250 | –     | 270 | 10  | 670 | 130 | 48  | 70  | M42 | 15  |
| 344   | 510   | 210   | –     | M200X3  | 100 | 240 | 90  | 360 | 260 | 20    | 280 | 10  | 670 | 130 | 48  | 70  | M42 | –   |
| 344   | 510   | 210   | 195   | M200X3  | 100 | 240 | 90  | 360 | 260 | –     | 280 | 10  | 670 | 130 | 48  | 70  | M42 | 15  |
| 380   | 565   | 230   | –     | Tr220X4 | 108 | 240 | 105 | 400 | 280 | 20    | 310 | 10  | 720 | 130 | 48  | 70  | M42 | –   |
| 380   | 565   | 230   | 212   | Tr220X4 | 108 | 240 | 105 | 400 | 280 | –     | 310 | 10  | 720 | 130 | 48  | 70  | M42 | 15  |
| 400   | 615   | 260   | –     | Tr240X4 | 120 | 280 | 120 | 440 | 300 | 20    | 340 | 10  | 820 | 165 | 48  | 70  | M42 | –   |
| 400   | 615   | 260   | 235   | Tr240X4 | 120 | 280 | 120 | 440 | 300 | –     | 340 | 10  | 820 | 165 | 48  | 70  | M42 | 22  |



# Plummer block housings

LOE, split  
 For spherical roller bearings with tapered bore and adapter sleeve, oil lubrication



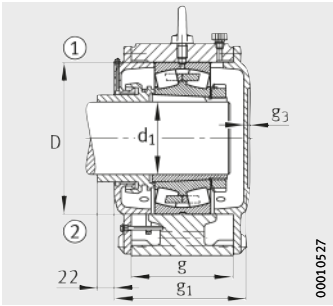
**Dimension table** - Dimensions in mm

| Designation <sup>1)</sup> |                      | Bearing      | Adapter sleeve | Initial oil filling quantity<br>l | Oil level<br>Height<br>x<br>mm | Mass<br>m<br>Housing<br>≈kg |
|---------------------------|----------------------|--------------|----------------|-----------------------------------|--------------------------------|-----------------------------|
| Locating bearing          | Non-locating bearing |              |                |                                   |                                |                             |
| LOE630-N-AF-L             | LOE630-N-AL-L        | 22330-E1-K   | H2330          | 6,2                               | 75-110                         | 200                         |
| LOE630-N-BF-L             | LOE630-N-BL-L        | 22330-E1-K   | H2330          | 6,2                               | 75-110                         | 200                         |
| LOE632-N-AF-L             | LOE632-N-AL-L        | 22332-K-MB   | H2332          | 7                                 | 80-105                         | 240                         |
| LOE632-N-BF-L             | LOE632-N-BL-L        | 22332-K-MB   | H2332          | 7                                 | 80-105                         | 240                         |
| LOE634-N-AF-L             | LOE634-N-AL-L        | 22334-K-MB   | H2334          | 7,2                               | 80-105                         | 270                         |
| LOE634-N-BF-L             | LOE634-N-BL-L        | 22334-K-MB   | H2334          | 7,2                               | 80-105                         | 270                         |
| LOE536-N-AF-L             | LOE536-N-AL-L        | 22236-E1-K   | H3136          | 6                                 | 75-110                         | 200                         |
| LOE536-N-BF-L             | LOE536-N-BL-L        | 22236-E1-K   | H3136          | 6                                 | 75-110                         | 200                         |
| LOE636-N-AF-L             | LOE636-N-AL-L        | 22336-K-MB   | H2336          | 7,4                               | 80-105                         | 330                         |
| LOE636-N-BF-L             | LOE636-N-BL-L        | 22336-K-MB   | H2336          | 7,4                               | 80-105                         | 330                         |
| LOE538-N-AF-L             | LOE538-N-AL-L        | 22238-K-MB   | H3138          | 7,2                               | 70-100                         | 230                         |
| LOE538-N-BF-L             | LOE538-N-BL-L        | 22238-K-MB   | H3138          | 7,2                               | 70-100                         | 230                         |
| LOE540-N-AF-L             | LOE540-N-AL-L        | 22240-B-K-MB | H3140          | 7,2                               | 75-100                         | 250                         |
| LOE540-N-BF-L             | LOE540-N-BL-L        | 22240-B-K-MB | H3140          | 7,2                               | 75-100                         | 250                         |
| LOE544-N-AF-L             | LOE544-N-AL-L        | 22244-B-K-MB | H3144X         | 8,2                               | 80-110                         | 310                         |
| LOE544-N-BF-L             | LOE544-N-BL-L        | 22244-B-K-MB | H3144X         | 8,2                               | 80-110                         | 310                         |
| LOE548-N-AF-L             | LOE548-N-AL-L        | 22248-B-K-MB | H3148X         | 8,4                               | 100-120                        | 385                         |
| LOE548-N-BF-L             | LOE548-N-BL-L        | 22248-B-K-MB | H3148X         | 8,4                               | 100-120                        | 385                         |

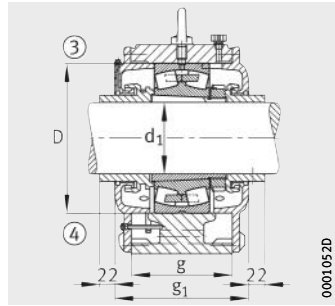
<sup>1)</sup> Ordering example:  
 Housing LOE538-N-BF-L (see also page 915), bearing 22238-K-MB (see bearing tables), adapter sleeve H3138 (see dimension tables).

<sup>2)</sup> ① Locating bearing AF  
 ② Non-locating bearing AL  
 ③ Locating bearing BF  
 ④ Non-locating bearing BL





Design A  
①, ②<sup>2)</sup>



Design B  
③, ④<sup>2)</sup>

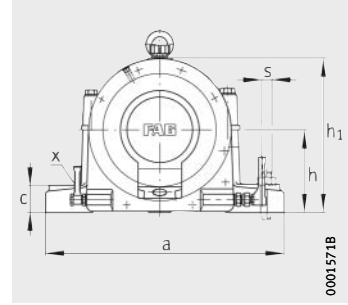
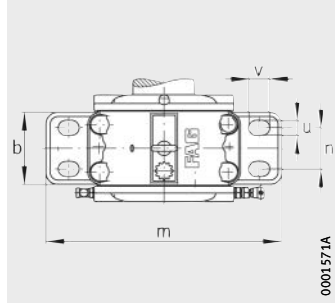
Dimensions

| d <sub>1</sub> | a   | g <sub>1</sub> | h <sub>1</sub> | b   | c   | D   | g   | g <sub>3</sub> | h   | k  | m   | n   | u  | v  | s   |
|----------------|-----|----------------|----------------|-----|-----|-----|-----|----------------|-----|----|-----|-----|----|----|-----|
| <b>135</b>     | 760 | 335            | 465            | 200 | 85  | 320 | 240 | 18             | 265 | 10 | 630 | 125 | 42 | 60 | M36 |
| <b>135</b>     | 760 | 335            | 465            | 200 | 85  | 320 | 240 | –              | 265 | 10 | 630 | 125 | 42 | 60 | M36 |
| <b>140</b>     | 820 | 350            | 485            | 240 | 90  | 340 | 250 | 20             | 270 | 10 | 670 | 130 | 48 | 70 | M42 |
| <b>140</b>     | 820 | 350            | 485            | 240 | 90  | 340 | 250 | –              | 270 | 10 | 670 | 130 | 48 | 70 | M42 |
| <b>150</b>     | 830 | 350            | 510            | 240 | 90  | 360 | 255 | 18             | 280 | 10 | 670 | 130 | 48 | 70 | M42 |
| <b>150</b>     | 830 | 350            | 510            | 240 | 90  | 360 | 255 | –              | 280 | 10 | 670 | 130 | 48 | 70 | M42 |
| <b>160</b>     | 710 | 300            | 465            | 200 | 85  | 320 | 210 | 20             | 260 | 10 | 580 | 110 | 42 | 60 | M36 |
| <b>160</b>     | 710 | 300            | 465            | 200 | 85  | 320 | 210 | –              | 260 | 10 | 580 | 110 | 42 | 60 | M36 |
| <b>160</b>     | 840 | 360            | 530            | 240 | 90  | 380 | 260 | 20             | 290 | 10 | 680 | 130 | 48 | 70 | M42 |
| <b>160</b>     | 840 | 360            | 530            | 240 | 90  | 380 | 260 | –              | 290 | 10 | 680 | 130 | 48 | 70 | M42 |
| <b>170</b>     | 820 | 350            | 485            | 240 | 90  | 340 | 250 | 20             | 270 | 10 | 670 | 130 | 48 | 70 | M42 |
| <b>170</b>     | 820 | 350            | 485            | 240 | 90  | 340 | 250 | –              | 270 | 10 | 670 | 130 | 48 | 70 | M42 |
| <b>180</b>     | 830 | 344            | 510            | 240 | 90  | 360 | 260 | 20             | 280 | 10 | 670 | 130 | 48 | 70 | M42 |
| <b>180</b>     | 830 | 344            | 510            | 240 | 90  | 360 | 260 | –              | 280 | 10 | 670 | 130 | 48 | 70 | M42 |
| <b>200</b>     | 880 | 380            | 565            | 240 | 105 | 400 | 280 | 20             | 310 | 10 | 720 | 130 | 48 | 70 | M42 |
| <b>200</b>     | 880 | 380            | 565            | 240 | 105 | 400 | 280 | –              | 310 | 10 | 720 | 130 | 48 | 70 | M42 |
| <b>220</b>     | 980 | 400            | 625            | 280 | 120 | 440 | 300 | 20             | 340 | 10 | 820 | 165 | 48 | 70 | M42 |
| <b>220</b>     | 980 | 400            | 625            | 280 | 120 | 440 | 300 | –              | 340 | 10 | 820 | 165 | 48 | 70 | M42 |



# Plummer block housings

LOU, split  
For spherical roller bearings with cylindrical bore, recirculating oil lubrication

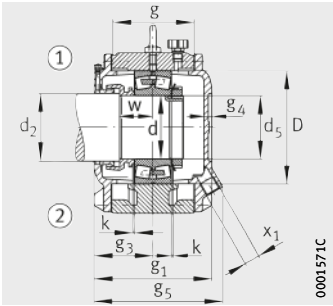


**Dimension table** - Dimensions in mm

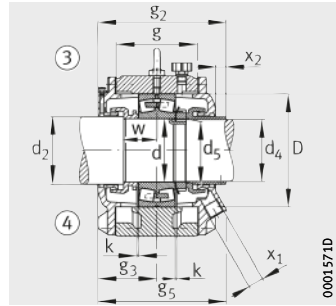
| Designation <sup>1)</sup> |                      |            |           |            | Oil level   | Mass m      | Dimensions |     |                |                |                |                |
|---------------------------|----------------------|------------|-----------|------------|-------------|-------------|------------|-----|----------------|----------------|----------------|----------------|
| Housing                   |                      | Bearing    | Shaft nut | Tab washer | Height x mm | Housing ≈kg | d          | a   | g <sub>1</sub> | h <sub>1</sub> | d <sub>2</sub> | d <sub>4</sub> |
| Locating bearing          | Non-locating bearing |            |           |            |             |             |            |     |                |                |                |                |
| <b>LOU330-AF-L</b>        | <b>LOU330-AL-L</b>   | 22330-E1   | KM30      | MB30       | 135         | 200         | <b>150</b> | 760 | 335            | 465            | 160            | –              |
| <b>LOU330-BF-L</b>        | <b>LOU330-BL-L</b>   | 22330-E1   | KM30      | MB30       | 135         | 200         | <b>150</b> | 760 | –              | 465            | 160            | 147            |
| <b>LOU332-AF-L</b>        | <b>LOU332-AL-L</b>   | 22332-MB   | KM32      | MB32       | 133         | 240         | <b>160</b> | 820 | 350            | 485            | 166            | –              |
| <b>LOU332-BF-L</b>        | <b>LOU332-BL-L</b>   | 22332-MB   | KM32      | MB32       | 133         | 240         | <b>160</b> | 820 | –              | 485            | 166            | 155            |
| <b>LOU334-AF-L</b>        | <b>LOU334-AL-L</b>   | 22334-MB   | KM34      | MB34       | 133         | 270         | <b>170</b> | 830 | 350            | 510            | 180            | –              |
| <b>LOU334-BF-L</b>        | <b>LOU334-BL-L</b>   | 22334-MB   | KM34      | MB34       | 133         | 270         | <b>170</b> | 830 | –              | 510            | 180            | 165            |
| <b>LOU236-AF-L</b>        | <b>LOU236-AL-L</b>   | 22236-E1   | KM36      | MB36       | 125         | 200         | <b>180</b> | 710 | 300            | 465            | 190            | –              |
| <b>LOU236-BF-L</b>        | <b>LOU236-BL-L</b>   | 22236-E1   | KM36      | MB36       | 125         | 200         | <b>180</b> | 710 | –              | 465            | 190            | 175            |
| <b>LOU336-AF-L</b>        | <b>LOU336-AL-L</b>   | 22336-MB   | KM36      | MB36       | 133         | 330         | <b>180</b> | 840 | 360            | 530            | 190            | –              |
| <b>LOU336-BF-L</b>        | <b>LOU336-BL-L</b>   | 22336-MB   | KM36      | MB36       | 133         | 330         | <b>180</b> | 840 | –              | 530            | 190            | 175            |
| <b>LOU238-AF-L</b>        | <b>LOU238-AL-L</b>   | 22238-MB   | KM38      | MB38       | 127         | 230         | <b>190</b> | 820 | 350            | 485            | 196            | –              |
| <b>LOU238-BF-L</b>        | <b>LOU238-BL-L</b>   | 22238-MB   | KM38      | MB38       | 127         | 230         | <b>190</b> | 820 | –              | 485            | 196            | 185            |
| <b>LOU240-AF-L</b>        | <b>LOU240-AL-L</b>   | 22240-B-MB | KM40      | MB40       | 130         | 250         | <b>200</b> | 830 | 360            | 510            | 210            | –              |
| <b>LOU240-BF-L</b>        | <b>LOU240-BL-L</b>   | 22240-B-MB | KM40      | MB40       | 130         | 250         | <b>200</b> | 830 | –              | 510            | 210            | 195            |
| <b>LOU244-AF-L</b>        | <b>LOU244-AL-L</b>   | 22244-B-MB | HM44T     | MB44       | 145         | 310         | <b>220</b> | 880 | 380            | 565            | 230            | –              |
| <b>LOU244-BF-L</b>        | <b>LOU244-BL-L</b>   | 22244-B-MB | HM44T     | MB44       | 145         | 310         | <b>220</b> | 880 | –              | 565            | 230            | 212            |
| <b>LOU248-AF-L</b>        | <b>LOU248-AL-L</b>   | 22248-B-MB | HM48T     | MB48       | 155         | 385         | <b>240</b> | 980 | 400            | 615            | 260            | –              |
| <b>LOU248-BF-L</b>        | <b>LOU248-BL-L</b>   | 22248-B-MB | HM48T     | MB48       | 155         | 385         | <b>240</b> | 980 | –              | 615            | 260            | 235            |

<sup>1)</sup> Ordering example:  
Housing LOU238-BF-L (see also page 914), bearing 22238-MB (see bearing tables), locknut KM38, tab washer MB38 (see dimension tables).

<sup>2)</sup> ① Locating bearing AF  
② Non-locating bearing AL  
③ Locating bearing BF  
④ Non-locating bearing BL



Design A  
①, ②<sup>2)</sup>



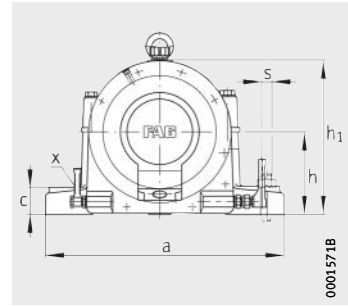
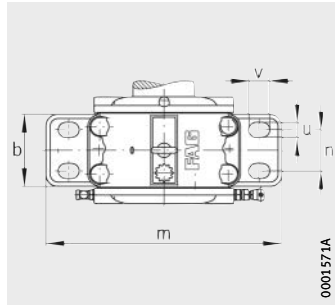
Design B  
③, ④<sup>2)</sup>

| d <sub>5</sub> | w   | b   | c   | D   | g   | g <sub>2</sub> | g <sub>3</sub> | g <sub>4</sub> | g <sub>5</sub> | h   | k  | m   | n   | u  | v  | s   | x <sub>1</sub><br>Inch size<br>thread | x <sub>2</sub> |
|----------------|-----|-----|-----|-----|-----|----------------|----------------|----------------|----------------|-----|----|-----|-----|----|----|-----|---------------------------------------|----------------|
| M150X2         | 95  | 200 | 85  | 320 | 240 | –              | 168            | 18             | –              | 265 | 10 | 630 | 125 | 42 | 60 | M36 | G11/4                                 | –              |
| M150X2         | 95  | 200 | 85  | 320 | 240 | 350            | 168            | –              | –              | 265 | 10 | 630 | 125 | 42 | 60 | M36 | G11/4                                 | 15             |
| M160X3         | 100 | 240 | 90  | 340 | 250 | –              | 175            | 20             | 395            | 270 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | –              |
| M160X3         | 100 | 240 | 90  | 340 | 250 | 365            | 175            | –              | 395            | 270 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| M170X3         | 105 | 240 | 90  | 360 | 255 | –              | 175            | 18             | –              | 280 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | –              |
| M170X3         | 105 | 240 | 90  | 360 | 255 | 365            | 175            | –              | –              | 280 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| M180X3         | 90  | 200 | 85  | 320 | 210 | –              | 150            | 20             | 325            | 260 | 10 | 580 | 110 | 42 | 60 | M36 | G11/4                                 | –              |
| M180X3         | 90  | 200 | 85  | 320 | 210 | 315            | 150            | –              | 325            | 260 | 10 | 580 | 110 | 42 | 60 | M36 | G11/4                                 | 15             |
| M180X3         | 108 | 240 | 90  | 380 | 260 | –              | 180            | 20             | –              | 290 | 10 | 680 | 130 | 48 | 70 | M42 | G11/4                                 | –              |
| M180X3         | 108 | 240 | 90  | 380 | 260 | 375            | 180            | –              | –              | 290 | 10 | 680 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| M190X3         | 95  | 240 | 90  | 340 | 250 | –              | 175            | 20             | 383            | 270 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | –              |
| M190X3         | 95  | 240 | 90  | 340 | 250 | 365            | 175            | –              | 383            | 270 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| M200X3         | 100 | 240 | 90  | 360 | 260 | –              | 180            | 20             | 389            | 280 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | –              |
| M200X3         | 100 | 240 | 90  | 360 | 260 | 375            | 180            | –              | 389            | 280 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| Tr220X4        | 108 | 240 | 105 | 400 | 280 | –              | 190            | 20             | 405            | 310 | 10 | 720 | 130 | 48 | 70 | M42 | G11/4                                 | –              |
| Tr220X4        | 108 | 240 | 105 | 400 | 280 | 395            | 190            | –              | 405            | 310 | 10 | 720 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| Tr240X4        | 120 | 280 | 120 | 440 | 300 | –              | 200            | 20             | 428            | 340 | 10 | 820 | 165 | 48 | 70 | M42 | G11/4                                 | –              |
| Tr240X4        | 120 | 280 | 120 | 440 | 300 | 415            | 200            | –              | 428            | 340 | 10 | 820 | 165 | 48 | 70 | M42 | G11/4                                 | 15             |



# Plummer block housings

LOU, split  
 For spherical roller bearings with tapered bore and adapter sleeve, recirculating oil lubrication

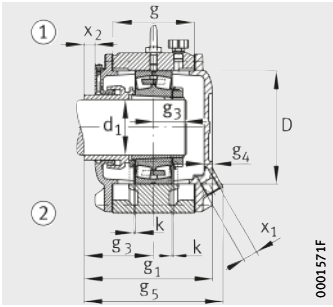


**Dimension table** - Dimensions in mm

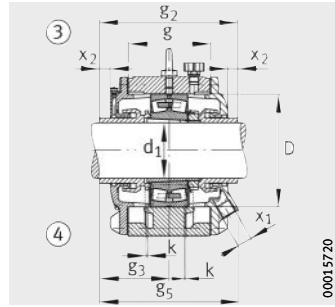
| Designation <sup>1)</sup> |                      |              |                | Oil level<br>Height<br>x<br>mm | Mass<br>m<br>Housing<br>≈kg | Dimensions     |     |                |                |
|---------------------------|----------------------|--------------|----------------|--------------------------------|-----------------------------|----------------|-----|----------------|----------------|
| Housing                   |                      | Bearing      | Adapter sleeve |                                |                             | d <sub>1</sub> | a   | g <sub>1</sub> | h <sub>1</sub> |
| Locating bearing          | Non-locating bearing |              |                |                                |                             |                |     |                |                |
| <b>LOU630-AF-L</b>        | <b>LOU630-AL-L</b>   | 22330-E1-K   | H2330          | 135                            | 200                         | <b>135</b>     | 760 | 335            | 465            |
| <b>LOU630-BF-L</b>        | <b>LOU630-BL-L</b>   | 22330-E1-K   | H2330          | 135                            | 200                         | <b>135</b>     | 760 | –              | 465            |
| <b>LOU632-AF-L</b>        | <b>LOU632-AL-L</b>   | 22332-K-MB   | H2332          | 133                            | 240                         | <b>140</b>     | 820 | 350            | 485            |
| <b>LOU632-BF-L</b>        | <b>LOU632-BL-L</b>   | 22332-K-MB   | H2332          | 133                            | 240                         | <b>140</b>     | 820 | –              | 485            |
| <b>LOU634-AF-L</b>        | <b>LOU634-AL-L</b>   | 22334-K-MB   | H2334          | 133                            | 270                         | <b>150</b>     | 830 | 350            | 510            |
| <b>LOU634-BF-L</b>        | <b>LOU634-BL-L</b>   | 22334-K-MB   | H2334          | 133                            | 270                         | <b>150</b>     | 830 | –              | 510            |
| <b>LOU536-AF-L</b>        | <b>LOU536-AL-L</b>   | 22236-E1-K   | H3136          | 125                            | 200                         | <b>160</b>     | 710 | 300            | 465            |
| <b>LOU536-BF-L</b>        | <b>LOU536-BL-L</b>   | 22236-E1-K   | H3136          | 125                            | 200                         | <b>160</b>     | 710 | –              | 465            |
| <b>LOU636-AF-L</b>        | <b>LOU636-AL-L</b>   | 22336-K-MB   | H2336          | 133                            | 330                         | <b>160</b>     | 840 | 360            | 530            |
| <b>LOU636-BF-L</b>        | <b>LOU636-BL-L</b>   | 22336-K-MB   | H2336          | 133                            | 330                         | <b>160</b>     | 840 | –              | 530            |
| <b>LOU538-AF-L</b>        | <b>LOU538-AL-L</b>   | 22238-K-MB   | H3138          | 127                            | 230                         | <b>170</b>     | 820 | 350            | 485            |
| <b>LOU538-BF-L</b>        | <b>LOU538-BL-L</b>   | 22238-K-MB   | H3138          | 127                            | 230                         | <b>170</b>     | 820 | –              | 485            |
| <b>LOU540-AF-L</b>        | <b>LOU540-AL-L</b>   | 22240-B-K-MB | H3140          | 130                            | 250                         | <b>180</b>     | 830 | 360            | 510            |
| <b>LOU540-BF-L</b>        | <b>LOU540-BL-L</b>   | 22240-B-K-MB | H3140          | 130                            | 250                         | <b>180</b>     | 830 | –              | 510            |
| <b>LOU544-AF-L</b>        | <b>LOU544-AL-L</b>   | 22244-B-K-MB | H3144X         | 145                            | 310                         | <b>200</b>     | 880 | 380            | 565            |
| <b>LOU544-BF-L</b>        | <b>LOU544-BL-L</b>   | 22244-B-K-MB | H3144X         | 145                            | 310                         | <b>200</b>     | 880 | –              | 565            |
| <b>LOU548-AF-L</b>        | <b>LOU548-AL-L</b>   | 22248-B-K-MB | H3148X         | 155                            | 385                         | <b>220</b>     | 980 | 400            | 625            |
| <b>LOU548-BF-L</b>        | <b>LOU548-BL-L</b>   | 22248-B-K-MB | H3148X         | 155                            | 385                         | <b>220</b>     | 980 | –              | 625            |

<sup>1)</sup> Ordering example:  
 Housing LOU538-BF-L (see also page 916), bearing 22238-K-MB (see bearing tables), adapter sleeve H3138 (see dimension tables).

<sup>2)</sup> ① Locating bearing AF  
 ② Non-locating bearing AL  
 ③ Locating bearing BF  
 ④ Non-locating bearing BL



Design A  
①, ②<sup>2)</sup>



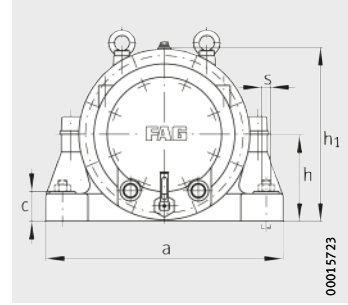
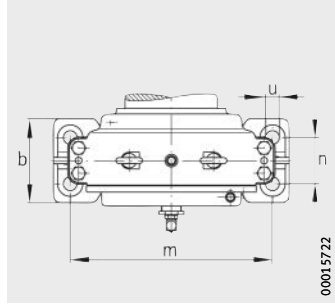
Design B  
③, ④<sup>2)</sup>

| b   | c   | D   | g   | g <sub>2</sub> | g <sub>3</sub> | g <sub>4</sub> | g <sub>5</sub> | h   | k  | m   | n   | u  | v  | s   | x <sub>1</sub><br>Inch size<br>thread | x <sub>2</sub> |
|-----|-----|-----|-----|----------------|----------------|----------------|----------------|-----|----|-----|-----|----|----|-----|---------------------------------------|----------------|
| 200 | 85  | 320 | 240 | –              | 168            | 18             | –              | 265 | 10 | 630 | 125 | 42 | 60 | M36 | G11/4                                 | 15             |
| 200 | 85  | 320 | 240 | 350            | 168            | –              | –              | 265 | 10 | 630 | 125 | 42 | 60 | M36 | G11/4                                 | 15             |
| 240 | 90  | 340 | 250 | –              | 175            | 20             | 395            | 270 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 90  | 340 | 250 | 365            | 175            | –              | 395            | 270 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 90  | 360 | 255 | –              | 175            | 18             | –              | 280 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 90  | 360 | 255 | 365            | 175            | –              | –              | 280 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 200 | 85  | 320 | 210 | –              | 150            | 20             | 325            | 260 | 10 | 580 | 110 | 42 | 60 | M36 | G11/4                                 | 15             |
| 200 | 85  | 320 | 210 | 315            | 150            | –              | 325            | 260 | 10 | 580 | 110 | 42 | 60 | M36 | G11/4                                 | 15             |
| 240 | 90  | 380 | 260 | –              | 180            | 20             | –              | 290 | 10 | 680 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 90  | 380 | 260 | 375            | 180            | –              | –              | 290 | 10 | 680 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 90  | 340 | 250 | –              | 175            | 20             | 383            | 270 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 90  | 340 | 250 | 365            | 175            | –              | 383            | 270 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 90  | 360 | 260 | –              | 180            | 20             | 389            | 280 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 90  | 360 | 260 | 375            | 180            | –              | 389            | 280 | 10 | 670 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 105 | 400 | 280 | –              | 190            | 20             | 405            | 310 | 10 | 720 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 240 | 105 | 400 | 280 | 395            | 190            | –              | 405            | 310 | 10 | 720 | 130 | 48 | 70 | M42 | G11/4                                 | 15             |
| 280 | 120 | 440 | 300 | –              | 200            | 20             | 428            | 340 | 10 | 820 | 165 | 48 | 70 | M42 | G11/4                                 | 15             |
| 280 | 120 | 440 | 300 | 415            | 200            | –              | 428            | 340 | 10 | 820 | 165 | 48 | 70 | M42 | G11/4                                 | 15             |



# Plummer block housings

PM30, split  
 For spherical roller bearings with tapered bore and adapter sleeve, for direct bearing seat



①, ②, ③, ④<sup>4)</sup>

**Dimension table** - Dimensions in mm

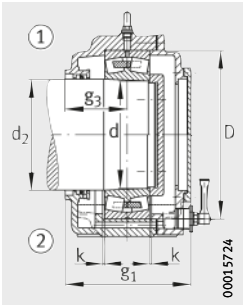
| Designation <sup>1)</sup> |          |                | Mass<br>m<br>Housing<br>≈ kg | Dimensions     |                |                |                |                |       |
|---------------------------|----------|----------------|------------------------------|----------------|----------------|----------------|----------------|----------------|-------|
| Housing                   | Bearing  | Adapter sleeve |                              | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> | d <sub>4</sub> | d <sub>5</sub> | a     |
| PM3044                    | 23044-   | H3044X         | 105                          | 200            | 228            | 212            | 200            | Tr220X4        | 560   |
| PM3048                    | 23048-   | H3048          | 120                          | 220            | 248            | 236            | 220            | Tr240X4        | 580   |
| PM3052                    | 23052-   | H3052X         | 145                          | 240            | 269            | 256            | 240            | Tr260X4        | 620   |
| PM3056                    | 23056-   | H3056          | 170                          | 260            | 289            | 276            | 260            | Tr280X4        | 660   |
| PM3060                    | 23060-   | H3060          | 200                          | 280            | 310            | 300            | 280            | Tr300X4        | 700   |
| PM3064                    | 23064-   | H3064          | 220                          | 300            | 330            | 320            | 300            | Tr320X5        | 730   |
| PM3068                    | 23068-   | H3068          | 290                          | 320            | 352            | 340            | 320            | Tr340X5        | 800   |
| PM3072                    | 23072-   | H3072          | 300                          | 340            | 372            | 360            | 340            | Tr360X5        | 830   |
| PM3076                    | 23076-   | H3076          | 330                          | 360            | 392            | 380            | 360            | Tr380X5        | 860   |
| PM3080                    | 23080-   | H3080          | 445                          | 380            | 413            | 400            | 380            | Tr400X5        | 920   |
| PM3084                    | 23084-   | H3084X         | 550                          | 400            | 433            | 420            | 400            | Tr420X5        | 950   |
| PM3088                    | 23088-   | H3088          | 645                          | 410            | 454            | 430            | 410            | Tr440X5        | 1 000 |
| PM3092                    | 23092-   | H3092          | 700                          | 430            | 474            | 450            | 430            | Tr460X5        | 1 050 |
| PM3096                    | 23096-   | H3096          | 820                          | 450            | 494            | 470            | 450            | Tr480X5        | 1 080 |
| PM30/500                  | 230/500- | H30/500        | 900                          | 470            | 514            | 490            | 470            | Tr500X5        | 1 100 |
| PM30/530                  | 230/530- | H30/530        | 1 100                        | 500            | 546            | 524            | 500            | Tr530X6        | 1 200 |
| PM30/560                  | 230/560- | H30/560        | 1 250                        | 530            | 577            | 554            | 530            | Tr560X6        | 1 300 |
| PM30/600                  | 230/600- | H30/600        | 1 400                        | 560            | 617            | 584            | 560            | Tr600X6        | 1 400 |
| PM30/630                  | 230/630- | H30/630        | 1 780                        | 600            | 648            | 624            | 600            | Tr630X6        | 1 440 |
| PM30/670                  | 230/670- | H30/670        | 1 900                        | 630            | 690            | 654            | 630            | Tr670X6        | 1 470 |
| PM30/710                  | 230/710- | H30/710        | 2 000                        | 670            | 730            | 694            | 670            | Tr710X6        | 1 500 |

1) Ordering example:  
 Housing PM30/500-H-AL-L (see also page 917), bearing 230/500-B-K-MB (see bearing tables), adapter sleeve H30/500-HG (see dimension tables).

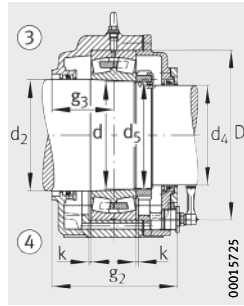
2) With adapter sleeve.

3) Direct bearing seat.

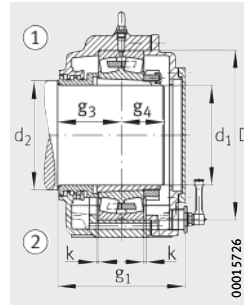
4) ① Locating bearing AF  
 ② Non-locating bearing AL  
 ③ Locating bearing BF  
 ④ Non-locating bearing BL



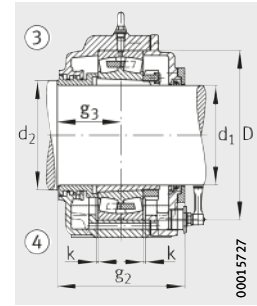
Design A  
for direct bearing seat



Design B  
for direct bearing seat



Design A  
with adapter sleeve



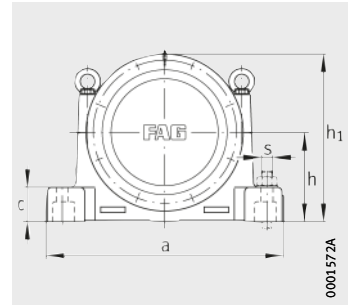
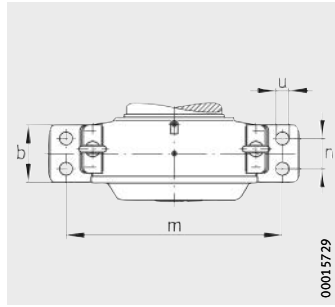
Design B  
with adapter sleeve

| $g_1^{2)}$ | $g_1^{3)}$ | $h_1$ | b   | c   | D    | $g_2^{2)}$ | $g_2^{3)}$ | $g_3^{2)}$ | $g_3^{3)}$ | $g_4$ | h   | k  | m    | n   | u  | s   |
|------------|------------|-------|-----|-----|------|------------|------------|------------|------------|-------|-----|----|------|-----|----|-----|
| 255        | 253        | 410   | 200 | 70  | 340  | 255        | 253        | 127        | 125        | 118   | 205 | 6  | 480  | 110 | 28 | M24 |
| 280        | 270        | 427,5 | 200 | 70  | 360  | 280        | 270        | 140        | 130        | 130   | 215 | 6  | 490  | 110 | 35 | M30 |
| 300        | 298        | 475   | 240 | 80  | 400  | 300        | 298        | 150        | 148        | 140   | 240 | 6  | 530  | 150 | 35 | M30 |
| 310        | 300        | 500   | 240 | 85  | 420  | 310        | 300        | 155        | 145        | 145   | 250 | 6  | 570  | 150 | 42 | M36 |
| 345        | 335        | 540   | 260 | 90  | 460  | 345        | 335        | 170        | 160        | 165   | 270 | 8  | 600  | 160 | 42 | M36 |
| 355        | 345        | 560   | 270 | 90  | 480  | 355        | 345        | 175        | 165        | 170   | 280 | 8  | 630  | 165 | 42 | M36 |
| 390        | 380        | 608   | 300 | 95  | 520  | 390        | 380        | 190        | 180        | 190   | 305 | 10 | 690  | 190 | 42 | M36 |
| 395        | 385        | 628   | 310 | 95  | 540  | 395        | 385        | 195        | 185        | 190   | 315 | 10 | 720  | 200 | 42 | M36 |
| 400        | 390        | 643   | 320 | 95  | 560  | 400        | 390        | 200        | 190        | 190   | 325 | 10 | 750  | 210 | 42 | M36 |
| 422        | 412        | 695   | 340 | 100 | 600  | 422        | 412        | 210        | 200        | 202   | 350 | 10 | 790  | 220 | 49 | M42 |
| 430        | 420        | 720   | 350 | 100 | 620  | 430        | 420        | 215        | 205        | 205   | 360 | 10 | 820  | 230 | 49 | M42 |
| 455        | 445        | 760   | 370 | 100 | 650  | 455        | 445        | 225        | 215        | 220   | 380 | 10 | 860  | 240 | 49 | M42 |
| 465        | 455        | 785   | 390 | 110 | 680  | 465        | 455        | 230        | 220        | 225   | 395 | 11 | 900  | 250 | 56 | M48 |
| 475        | 465        | 805   | 400 | 110 | 700  | 475        | 465        | 235        | 225        | 230   | 405 | 11 | 930  | 260 | 56 | M48 |
| 485        | 475        | 825   | 410 | 110 | 720  | 485        | 475        | 240        | 230        | 235   | 415 | 11 | 950  | 270 | 56 | M48 |
| 530        | 520        | 895   | 450 | 120 | 780  | 530        | 520        | 260        | 250        | 260   | 450 | 12 | 1040 | 290 | 56 | M48 |
| 585        | 565        | 960   | 440 | 140 | 820  | 585        | 565        | 270        | 250        | 305   | 485 | 12 | 1080 | 280 | 56 | M48 |
| 610        | 585        | 1020  | 460 | 140 | 870  | 610        | 585        | 290        | 265        | 310   | 515 | 12 | 1200 | 300 | 56 | M48 |
| 615        | 590        | 1075  | 480 | 160 | 920  | 615        | 590        | 290        | 265        | 315   | 540 | 14 | 1260 | 320 | 56 | M48 |
| 675        | 660        | 1135  | 500 | 170 | 980  | 675        | 660        | 320        | 305        | 345   | 570 | 14 | 1280 | 320 | 56 | M48 |
| 720        | 700        | 1190  | 520 | 180 | 1030 | 720        | 700        | 340        | 320        | 370   | 600 | 14 | 1300 | 320 | 56 | M48 |



# Plummer block housings

RA, split  
 For spherical roller bearings with cylindrical bore, with tapered bore and withdrawal sleeve



①, ②, ③, ④<sup>2)</sup>

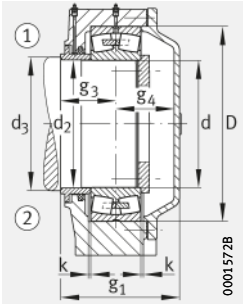
**Dimension table** - Dimensions in mm

| Designation <sup>1)</sup> |          |                   | Mass<br>m<br>≈kg | Dimensions |                |                |                        |                |      |
|---------------------------|----------|-------------------|------------------|------------|----------------|----------------|------------------------|----------------|------|
| Housing                   | Bearing  | Withdrawal sleeve |                  | d          | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub><br>min. | d <sub>4</sub> | a    |
| RA3044                    | 23044-   | AH3044            | 110              | 220        | 200            | 222            | 228                    | 218            | 600  |
| RA3948                    | 23948-   | AH3948            | 85               | 240        | 220            | 242            | 250                    | 238            | 580  |
| RA3048                    | 23048-   | AH3048            | 130              | 240        | 220            | 242            | 250                    | 238            | 670  |
| RA3952                    | 23952-   | AH3952            | 100              | 260        | 240            | 262            | 270                    | 258            | 670  |
| RA3052                    | 23052-   | AH3052            | 160              | 260        | 240            | 262            | 270                    | 258            | 710  |
| RA3956                    | 23956-   | AH3956            | 110              | 280        | 260            | 282            | 292                    | 278            | 670  |
| RA3056                    | 23056-   | AH3056            | 180              | 280        | 260            | 282            | 292                    | 278            | 730  |
| RA3960                    | 23960-   | AH3960            | 145              | 300        | 280            | 302            | 312                    | 298            | 730  |
| RA3060                    | 23060-   | AH3060            | 270              | 300        | 280            | 302            | 312                    | 298            | 825  |
| RA3964                    | 23964-   | AH3964            | 150              | 320        | 300            | 322            | 334                    | 318            | 730  |
| RA3064                    | 23064-   | AH3064            | 320              | 320        | 300            | 322            | 334                    | 318            | 855  |
| RA3968                    | 23968-   | AH3968            | 230              | 340        | 320            | 342            | 354                    | 338            | 825  |
| RA3068                    | 23068-   | AH3068            | 350              | 340        | 320            | 342            | 354                    | 338            | 900  |
| RA3972                    | 23972-   | AH3972            | 260              | 360        | 340            | 362            | 374                    | 358            | 855  |
| RA3072                    | 23072-   | AH3072            | 380              | 360        | 340            | 362            | 374                    | 358            | 970  |
| RA3976                    | 23976-   | AH3976            | 310              | 380        | 360            | 382            | 394                    | 378            | 900  |
| RA3076                    | 23076-   | AH3076            | 410              | 380        | 360            | 382            | 396                    | 378            | 1000 |
| RA3980                    | 23980-   | AH3980            | 350              | 400        | 380            | 402            | 416                    | 398            | 970  |
| RA3080                    | 23080-   | AH3080            | 470              | 400        | 380            | 402            | 416                    | 398            | 1060 |
| RA3984                    | 23984-   | AH3984            | 400              | 420        | 400            | 422            | 436                    | 418            | 1000 |
| RA3084                    | 23084-   | AH3084            | 520              | 420        | 400            | 422            | 436                    | 418            | 1130 |
| RA3988                    | 23988-   | AH3988            | 410              | 440        | 420            | 442            | 456                    | 438            | 1060 |
| RA3088                    | 23088-   | AHX3088           | 620              | 440        | 420            | 442            | 456                    | 438            | 1160 |
| RA3992                    | 23992-   | AH3992            | 520              | 460        | 440            | 462            | 476                    | 458            | 1130 |
| RA3092                    | 23092-   | AHX3092           | 650              | 460        | 440            | 462            | 476                    | 458            | 1250 |
| RA3996                    | 23996-   | AH3996            | 610              | 480        | 460            | 482            | 496                    | 478            | 1160 |
| RA3096                    | 23096-   | AHX3096           | 670              | 480        | 460            | 482            | 496                    | 478            | 1260 |
| RA39/500                  | 239/500- | AH39/500          | 610              | 500        | 480            | 502            | 516                    | 498            | 1160 |
| RA30/500                  | 230/500- | AHX30/500         | 700              | 500        | 480            | 502            | 516                    | 498            | 1280 |

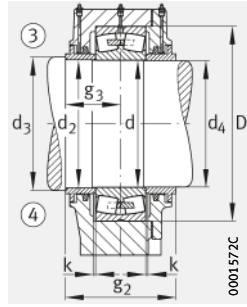
<sup>1)</sup> Ordering example:  
 Housing RA3072-Z-AF-L (see also page 919), bearing 23072-MB (see bearing tables).

<sup>2)</sup> ① Locating bearing AF  
 ② Non-locating bearing AL  
 ③ Locating bearing BF  
 ④ Non-locating bearing BL

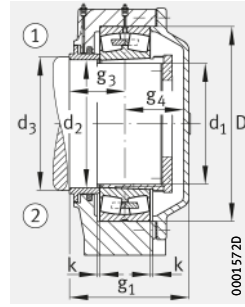




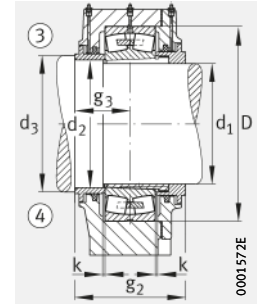
Design A  
For bearings with cylindrical bore



Design B



Design A  
For bearings with tapered bore and  
withdrawal sleeve



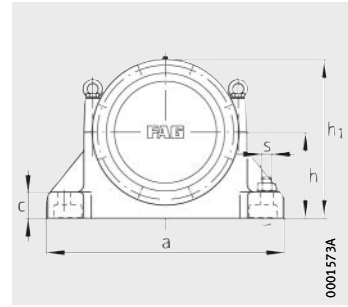
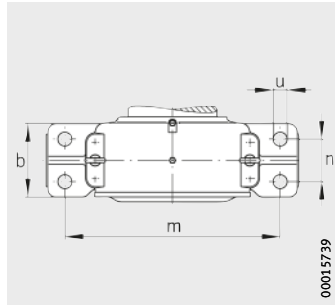
Design B

| g <sub>1</sub> | h <sub>1</sub> | b   | D   | c   | g <sub>2</sub> | g <sub>3</sub> | g <sub>4</sub><br>min. | h   | k | m    | n   | u  | s   |
|----------------|----------------|-----|-----|-----|----------------|----------------|------------------------|-----|---|------|-----|----|-----|
| 225            | 430            | 150 | 340 | 90  | 204            | 102            | 111                    | 230 | 4 | 520  | 80  | 28 | M24 |
| 190            | 395            | 140 | 320 | 95  | 170            | 85             | 93                     | 210 | 4 | 490  | 70  | 28 | M24 |
| 240            | 450            | 160 | 360 | 95  | 220            | 110            | 118                    | 240 | 4 | 560  | 80  | 35 | M30 |
| 220            | 450            | 160 | 360 | 95  | 200            | 100            | 108                    | 240 | 5 | 560  | 80  | 35 | M30 |
| 255            | 510            | 160 | 400 | 108 | 226            | 113            | 130                    | 270 | 5 | 620  | 80  | 35 | M30 |
| 225            | 465            | 160 | 380 | 95  | 200            | 100            | 113                    | 240 | 5 | 560  | 240 | 35 | M30 |
| 260            | 525            | 165 | 420 | 115 | 232            | 116            | 132                    | 280 | 5 | 635  | 80  | 35 | M30 |
| 240            | 525            | 165 | 420 | 115 | 216            | 108            | 120                    | 280 | 5 | 635  | 80  | 35 | M30 |
| 280            | 580            | 190 | 460 | 120 | 260            | 130            | 136                    | 310 | 5 | 710  | 100 | 42 | M36 |
| 240            | 535            | 165 | 440 | 115 | 216            | 108            | 120                    | 280 | 5 | 635  | 80  | 35 | M30 |
| 285            | 600            | 200 | 480 | 130 | 270            | 135            | 138                    | 320 | 5 | 735  | 105 | 42 | M36 |
| 240            | 575            | 190 | 460 | 120 | 220            | 110            | 118                    | 310 | 5 | 710  | 100 | 42 | M36 |
| 310            | 650            | 210 | 520 | 140 | 280            | 140            | 158                    | 350 | 5 | 780  | 110 | 42 | M36 |
| 240            | 595            | 200 | 480 | 130 | 220            | 110            | 118                    | 320 | 5 | 735  | 105 | 42 | M36 |
| 318            | 672            | 220 | 540 | 145 | 290            | 145            | 161                    | 360 | 5 | 840  | 110 | 48 | M42 |
| 275            | 650            | 210 | 520 | 140 | 250            | 125            | 138                    | 350 | 6 | 780  | 110 | 42 | M36 |
| 330            | 695            | 230 | 560 | 150 | 300            | 150            | 168                    | 370 | 6 | 870  | 110 | 48 | M42 |
| 275            | 370            | 220 | 540 | 145 | 250            | 125            | 138                    | 360 | 6 | 840  | 110 | 48 | M42 |
| 335            | 750            | 240 | 600 | 160 | 300            | 150            | 173                    | 400 | 6 | 920  | 120 | 56 | M48 |
| 275            | 690            | 230 | 560 | 150 | 250            | 125            | 138                    | 370 | 6 | 870  | 110 | 48 | M42 |
| 360            | 770            | 240 | 620 | 165 | 300            | 150            | 195                    | 410 | 6 | 960  | 120 | 56 | M48 |
| 315            | 745            | 240 | 600 | 160 | 270            | 135            | 168                    | 400 | 7 | 920  | 120 | 56 | M48 |
| 375            | 810            | 260 | 650 | 170 | 324            | 162            | 198                    | 430 | 7 | 1000 | 120 | 56 | M48 |
| 315            | 765            | 240 | 620 | 162 | 270            | 135            | 165                    | 410 | 7 | 960  | 120 | 56 | M48 |
| 400            | 850            | 280 | 680 | 180 | 348            | 174            | 211                    | 450 | 7 | 1070 | 130 | 66 | M56 |
| 335            | 815            | 260 | 650 | 170 | 300            | 150            | 170                    | 430 | 7 | 1000 | 130 | 56 | M48 |
| 405            | 870            | 290 | 700 | 185 | 358            | 179            | 211                    | 460 | 7 | 1080 | 140 | 66 | M56 |
| 335            | 815            | 260 | 670 | 170 | 300            | 150            | 170                    | 430 | 7 | 1000 | 130 | 56 | M48 |
| 420            | 880            | 290 | 720 | 190 | 358            | 179            | 226                    | 460 | 7 | 1100 | 140 | 66 | M56 |



# Plummer block housings

RLE, split  
 For spherical roller bearings with cylindrical bore, with tapered bore and withdrawal sleeve



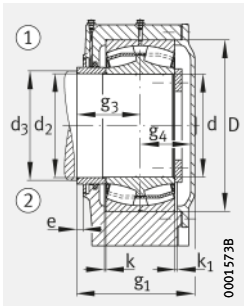
①, ②, ③, ④<sup>2)</sup>

**Dimension table** - Dimensions in mm

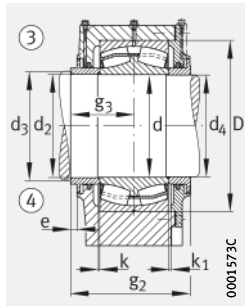
| Designation <sup>1)</sup> |          |                   | Mass<br>m<br>Housing<br>≈kg | Dimensions |                |                |                        |                |      |                |
|---------------------------|----------|-------------------|-----------------------------|------------|----------------|----------------|------------------------|----------------|------|----------------|
| Housing                   | Bearing  | Withdrawal sleeve |                             | d          | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub><br>min. | d <sub>4</sub> | a    | g <sub>1</sub> |
| <b>RLE4138</b>            | 24138-   | AH24138           | 115                         | <b>190</b> | 180            | 192            | 198                    | 175            | 600  | 230            |
| <b>RLE4140</b>            | 24140-   | AH24140           | 145                         | <b>200</b> | 190            | 202            | 212                    | 185            | 690  | 250            |
| <b>RLE4144</b>            | 24144-   | AH24144           | 175                         | <b>220</b> | 200            | 222            | 232                    | 195            | 720  | 265            |
| <b>RLE4148</b>            | 24148-   | AH24148           | 220                         | <b>240</b> | 220            | 242            | 252                    | 215            | 770  | 275            |
| <b>RLE4152</b>            | 24152-   | AH24152           | 295                         | <b>260</b> | 240            | 262            | 272                    | 235            | 860  | 305            |
| <b>RLE4156</b>            | 24156-   | AH24156           | 320                         | <b>280</b> | 260            | 282            | 292                    | 255            | 880  | 305            |
| <b>RLE4160</b>            | 24160-   | AH24160           | 415                         | <b>300</b> | 280            | 302            | 315                    | 275            | 940  | 335            |
| <b>RLE4164</b>            | 24164-   | AH24164           | 550                         | <b>320</b> | 300            | 322            | 335                    | 295            | 1060 | 365            |
| <b>RLE4168</b>            | 24168-   | AH24168           | 685                         | <b>340</b> | 320            | 342            | 355                    | 315            | 1110 | 400            |
| <b>RLE4172</b>            | 24172-   | AH24172           | 765                         | <b>360</b> | 340            | 362            | 375                    | 335            | 1190 | 400            |
| <b>RLE4176</b>            | 24176-   | AH24176           | 775                         | <b>380</b> | 360            | 382            | 395                    | 355            | 1190 | 400            |
| <b>RLE4180</b>            | 24180-   | AH24180           | 870                         | <b>400</b> | 380            | 402            | 415                    | 375            | 1230 | 410            |
| <b>RLE4184</b>            | 24184-   | AH24184           | 1100                        | <b>420</b> | 400            | 422            | 435                    | 395            | 1300 | 450            |
| <b>RLE4188</b>            | 24188-   | AH24188           | 1150                        | <b>440</b> | 420            | 442            | 455                    | 415            | 1370 | 450            |
| <b>RLE4192</b>            | 24192-   | AH24192           | 1400                        | <b>460</b> | 440            | 462            | 475                    | 435            | 1500 | 485            |
| <b>RLE4196</b>            | 24196-   | AH24196           | 1550                        | <b>480</b> | 460            | 482            | 495                    | 455            | 1530 | 500            |
| <b>RLE41/500</b>          | 241/500- | AH241/500         | 1600                        | <b>500</b> | 480            | 502            | 515                    | 475            | 1580 | 515            |

<sup>1)</sup> Ordering example:  
 Housing RLE4180-AH-BL-L (see also page 922), bearing 24180-B-K30 (see bearing tables), withdrawal sleeve AH24180-H (see dimension tables).

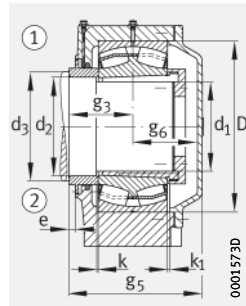
<sup>2)</sup> ① Locating bearing AF  
 ② Non-locating bearing AL  
 ③ Locating bearing BF  
 ④ Non-locating bearing BL



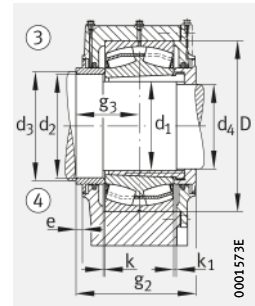
Design A  
For bearings with cylindrical bore



Design B



Design A  
For bearings with tapered bore and  
withdrawal sleeve



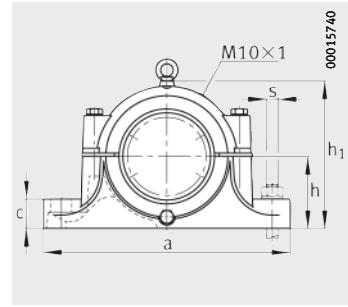
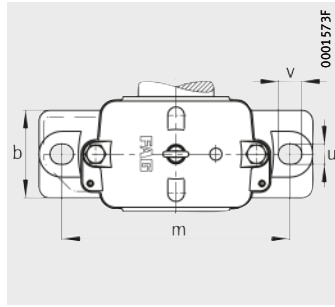
Design B

| $h_1$ | b   | c   | D   | e  | $g_2$ | $g_3$ | $g_4$<br>min. | $g_5$ | $g_6$<br>min. | h   | k | $k_1$ | m    | n   | u  | s   |
|-------|-----|-----|-----|----|-------|-------|---------------|-------|---------------|-----|---|-------|------|-----|----|-----|
| 412   | 180 | 70  | 320 | 15 | 240   | 127   | 95            | 272   | 137           | 225 | 1 | 4     | 510  | 100 | 36 | M30 |
| 442   | 195 | 75  | 340 | 15 | 260   | 137   | 105           | 287   | 142           | 240 | 1 | 4     | 580  | 105 | 42 | M36 |
| 477   | 210 | 80  | 370 | 15 | 270   | 142   | 113           | 307   | 155           | 260 | 1 | 4     | 610  | 120 | 42 | M36 |
| 517   | 225 | 85  | 400 | 15 | 280   | 148   | 117           | 323   | 165           | 280 | 1 | 5     | 655  | 130 | 42 | M36 |
| 567   | 250 | 95  | 440 | 15 | 315   | 165   | 130           | 350   | 175           | 310 | 1 | 5     | 730  | 140 | 49 | M42 |
| 587   | 250 | 100 | 460 | 15 | 315   | 165   | 130           | 350   | 175           | 320 | 2 | 5     | 750  | 145 | 49 | M42 |
| 642   | 280 | 110 | 500 | 15 | 335   | 176   | 147           | 386   | 198           | 350 | 2 | 5     | 800  | 165 | 49 | M42 |
| 697   | 305 | 120 | 540 | 20 | 370   | 196   | 157           | 421   | 213           | 380 | 2 | 5     | 900  | 170 | 56 | M48 |
| 752   | 340 | 130 | 580 | 20 | 405   | 210   | 178           | 480   | 258           | 410 | 2 | 5     | 940  | 195 | 56 | M48 |
| 792   | 340 | 135 | 600 | 20 | 405   | 210   | 178           | 480   | 258           | 430 | 2 | 5     | 1010 | 195 | 56 | M48 |
| 792   | 340 | 140 | 620 | 20 | 405   | 210   | 175           | 490   | 265           | 430 | 2 | 5     | 1010 | 195 | 68 | M56 |
| 827   | 350 | 145 | 650 | 20 | 415   | 215   | 180           | 500   | 270           | 450 | 2 | 5     | 1040 | 200 | 68 | M56 |
| 897   | 390 | 155 | 700 | 20 | 455   | 232   | 203           | 555   | 308           | 490 | 2 | 5     | 1110 | 225 | 68 | M56 |
| 917   | 390 | 155 | 720 | 20 | 455   | 232   | 203           | 555   | 308           | 500 | 2 | 5     | 1165 | 225 | 68 | M56 |
| 972   | 420 | 160 | 760 | 25 | 495   | 252   | 218           | 595   | 328           | 530 | 2 | 6     | 1270 | 240 | 76 | M64 |
| 1012  | 430 | 165 | 790 | 25 | 500   | 256   | 228           | 610   | 338           | 550 | 2 | 6     | 1300 | 245 | 76 | M64 |
| 1032  | 450 | 180 | 830 | 25 | 520   | 265   | 235           | 630   | 350           | 550 | 2 | 6     | 1300 | 260 | 76 | M64 |



# Plummer block housings

S30, split  
For spherical roller bearings with tapered bore and adapter sleeve



Cross-sections of split bearings see page 973

①, ②, ③, ④<sup>3)</sup>

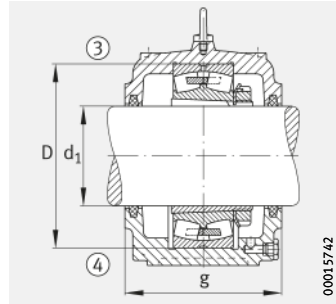
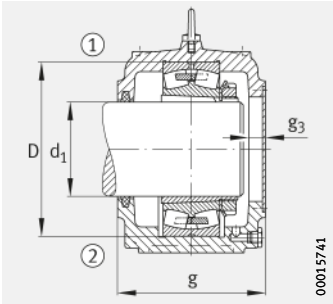
**Dimension table** - Dimensions in mm

| Designation <sup>1)</sup> |              |                |               | Felt strips |          | Mass m      |
|---------------------------|--------------|----------------|---------------|-------------|----------|-------------|
| Housing                   | Bearing      | Adapter sleeve | Split bearing | axBxL mm    | Quantity | Housing ≈kg |
| S3044-H-N-FZ-AF-L         | 23044-K-MB   | H3044X         | 230SM200-MB   | 16X12X350   | 2        | 98          |
| S3044-H-N-FZ-AL-L         | 23044-K-MB   | H3044X         | 230SM200-MB   | 16X12X350   | 2        | 98          |
| S3044-H-N-FZ-BF-L         | 23044-K-MB   | H3044X         | 230SM200-MB   | 16X12X350   | 4        | 98          |
| S3044-H-N-FZ-BL-L         | 23044-K-MB   | H3044X         | 230SM200-MB   | 16X12X350   | 4        | 98          |
| S3048-H-N-FZ-AF-L         | 23048-K-MB   | H3048          | 230SM220-MB   | 16X12X380   | 2        | 110         |
| S3048-H-N-FZ-AL-L         | 23048-K-MB   | H3048          | 230SM220-MB   | 16X12X380   | 2        | 110         |
| S3048-H-N-FZ-BF-L         | 23048-K-MB   | H3048          | 230SM220-MB   | 16X12X380   | 4        | 110         |
| S3048-H-N-FZ-BL-L         | 23048-K-MB   | H3048          | 230SM220-MB   | 16X12X380   | 4        | 110         |
| S3052-H-N-FZ-AF-L         | 23052-K-MB   | H3052X         | 230SM240-MB   | 16X12X410   | 2        | 148         |
| S3052-H-N-FZ-AL-L         | 23052-K-MB   | H3052X         | 230SM240-MB   | 16X12X410   | 2        | 148         |
| S3052-H-N-FZ-BF-L         | 23052-K-MB   | H3052X         | 230SM240-MB   | 16X12X410   | 4        | 148         |
| S3052-H-N-FZ-BL-L         | 23052-K-MB   | H3052X         | 230SM240-MB   | 16X12X410   | 4        | 148         |
| S3056-H-N-FZ-AF-L         | 23056-B-K-MB | H3056          | 230SM260-MB   | 16X12X445   | 2        | 165         |
| S3056-H-N-FZ-AL-L         | 23056-B-K-MB | H3056          | 230SM260-MB   | 16X12X445   | 2        | 165         |
| S3056-H-N-FZ-BF-L         | 23056-B-K-MB | H3056          | 230SM260-MB   | 16X12X445   | 4        | 165         |
| S3056-H-N-FZ-BL-L         | 23056-B-K-MB | H3056          | 230SM260-MB   | 16X12X445   | 4        | 165         |
| S3060-H-N-FZ-AF-L         | 23060-K-MB   | H3060          | 230SM280-MB   | 16X12X470   | 2        | 205         |
| S3060-H-N-FZ-AL-L         | 23060-K-MB   | H3060          | 230SM280-MB   | 16X12X470   | 2        | 205         |
| S3060-H-N-FZ-BF-L         | 23060-K-MB   | H3060          | 230SM280-MB   | 16X12X470   | 4        | 205         |
| S3060-H-N-FZ-BL-L         | 23060-K-MB   | H3060          | 230SM280-MB   | 16X12X470   | 4        | 205         |
| S3064-H-N-FZ-AF-L         | 23064-K-MB   | H3064-HG       | 230SM300-MB   | 16X12X505   | 2        | 235         |
| S3064-H-N-FZ-AL-L         | 23064-K-MB   | H3064-HG       | 230SM300-MB   | 16X12X505   | 2        | 235         |
| S3064-H-N-FZ-BF-L         | 23064-K-MB   | H3064-HG       | 230SM300-MB   | 16X12X505   | 4        | 235         |
| S3064-H-N-FZ-BL-L         | 23064-K-MB   | H3064-HG       | 230SM300-MB   | 16X12X505   | 4        | 235         |
| S3068-H-N-FZ-AF-L         | 23068-K-MB   | H3068-HG       | 230SM320-MB   | 16X12X535   | 2        | 280         |
| S3068-H-N-FZ-AL-L         | 23068-K-MB   | H3068-HG       | 230SM320-MB   | 16X12X535   | 2        | 280         |
| S3068-H-N-FZ-BF-L         | 23068-K-MB   | H3068-HG       | 230SM320-MB   | 16X12X535   | 4        | 280         |
| S3068-H-N-FZ-BL-L         | 23068-K-MB   | H3068-HG       | 230SM320-MB   | 16X12X535   | 4        | 280         |

1) Ordering example:  
Housing S3056-H-N-FZ-AL-L (see also page 923), bearing 23056-B-K-MB (see bearing tables), adapter sleeve H3056 (see dimension tables).

2) Four holes in base from S3060-H-N-FZ.

3) ① Locating bearing AF  
② Non-locating bearing AL  
③ Locating bearing BF  
④ Non-locating bearing BL



Design A  
Design B  
For bearings with tapered bore and adapter sleeve

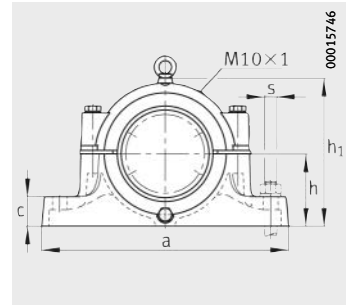
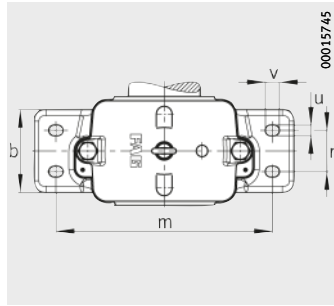
Dimensions

| d <sub>1</sub> | a    | g   | h <sub>1</sub> | b   | c  | D   | g <sub>3</sub> | h   | m   | n <sup>2)</sup> | u  | v  | s   |                               |
|----------------|------|-----|----------------|-----|----|-----|----------------|-----|-----|-----------------|----|----|-----|-------------------------------|
|                |      |     |                |     |    |     |                |     |     |                 |    |    | mm  | inch                          |
| 200            | 690  | 255 | 408            | 190 | 70 | 340 | 25             | 200 | 580 | –               | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 200            | 690  | 255 | 408            | 190 | 70 | 340 | 25             | 200 | 580 | –               | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 200            | 690  | 255 | 408            | 190 | 70 | 340 | –              | 200 | 580 | –               | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 200            | 690  | 255 | 408            | 190 | 70 | 340 | –              | 200 | 580 | –               | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 220            | 720  | 265 | 433            | 200 | 75 | 360 | 30             | 210 | 610 | –               | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 220            | 720  | 265 | 433            | 200 | 75 | 360 | 30             | 210 | 610 | –               | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 220            | 720  | 265 | 433            | 200 | 75 | 360 | –              | 210 | 610 | –               | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 220            | 720  | 265 | 433            | 200 | 75 | 360 | –              | 210 | 610 | –               | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 240            | 820  | 285 | 485            | 220 | 80 | 400 | 30             | 240 | 680 | –               | 52 | 70 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| 240            | 820  | 285 | 485            | 220 | 80 | 400 | 30             | 240 | 680 | –               | 52 | 70 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| 240            | 820  | 285 | 485            | 220 | 80 | 400 | –              | 240 | 680 | –               | 52 | 70 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| 240            | 820  | 285 | 485            | 220 | 80 | 400 | –              | 240 | 680 | –               | 52 | 70 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| 260            | 860  | 295 | 505            | 230 | 80 | 420 | 30             | 250 | 720 | –               | 52 | 70 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| 260            | 860  | 295 | 505            | 230 | 80 | 420 | 30             | 250 | 720 | –               | 52 | 70 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| 260            | 860  | 295 | 505            | 230 | 80 | 420 | –              | 250 | 720 | –               | 52 | 70 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| 260            | 860  | 295 | 505            | 230 | 80 | 420 | –              | 250 | 720 | –               | 52 | 70 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| 280            | 920  | 320 | 565            | 260 | 90 | 460 | 30             | 280 | 780 | 130             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 280            | 920  | 320 | 565            | 260 | 90 | 460 | 30             | 280 | 780 | 130             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 280            | 920  | 320 | 565            | 260 | 90 | 460 | –              | 280 | 780 | 130             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 280            | 920  | 320 | 565            | 260 | 90 | 460 | –              | 280 | 780 | 130             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 300            | 940  | 320 | 570            | 260 | 90 | 480 | 30             | 280 | 800 | 130             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 300            | 940  | 320 | 570            | 260 | 90 | 480 | 30             | 280 | 800 | 130             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 300            | 940  | 320 | 570            | 260 | 90 | 480 | –              | 280 | 800 | 130             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 300            | 940  | 320 | 570            | 260 | 90 | 480 | –              | 280 | 800 | 130             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 320            | 1000 | 340 | 615            | 280 | 95 | 520 | 30             | 300 | 860 | 140             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 320            | 1000 | 340 | 615            | 280 | 95 | 520 | 30             | 300 | 860 | 140             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 320            | 1000 | 340 | 615            | 280 | 95 | 520 | –              | 300 | 860 | 140             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 320            | 1000 | 340 | 615            | 280 | 95 | 520 | –              | 300 | 860 | 140             | 42 | 50 | M36 | 1 <sup>3</sup> / <sub>8</sub> |



# Plummer block housings

S30, split  
For spherical roller bearings with tapered bore and adapter sleeve



Cross-sections of unsplit bearings see page 971

①, ②, ③, ④<sup>3)</sup>

Dimension table (continued) · Dimensions in mm

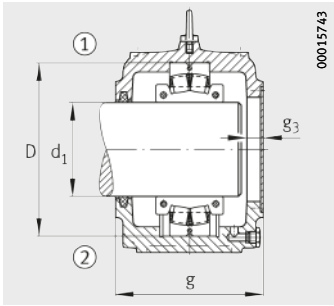
| Designation <sup>1)</sup> |              |                |                           | Felt strips |          | Mass m         |
|---------------------------|--------------|----------------|---------------------------|-------------|----------|----------------|
| Housing                   | Bearing      | Adapter sleeve | Split bearing             | aXbXl<br>mm | Quantity | Housing<br>≈kg |
| S3072-H-N-FZ-AF-L         | 23072-K-MB   | H3072-HG       | 230SM340-MB               | 16X12X565   | 2        | 340            |
| S3072-H-N-FZ-AL-L         | 23072-K-MB   | H3072-HG       | 230SM340-MB               | 16X12X565   | 2        | 340            |
| S3072-H-N-FZ-BF-L         | 23072-K-MB   | H3072-HG       | 230SM340-MB               | 16X12X565   | 4        | 340            |
| S3072-H-N-FZ-BL-L         | 23072-K-MB   | H3072-HG       | 230SM340-MB               | 16X12X565   | 4        | 340            |
| S3076-H-N-FZ-AF-L         | 23076-B-K-MB | H3076-HG       | 230SM360-MB               | 16X12X600   | 2        | 400            |
| S3076-H-N-FZ-AL-L         | 23076-B-K-MB | H3076-HG       | 230SM360-MB               | 16X12X600   | 2        | 400            |
| S3076-H-N-FZ-BF-L         | 23076-B-K-MB | H3076-HG       | 230SM360-MB               | 16X12X600   | 4        | 400            |
| S3076-H-N-FZ-BL-L         | 23076-B-K-MB | H3076-HG       | 230SM360-MB               | 16X12X600   | 4        | 400            |
| S3080-H-N-FZ-AF-L         | 23080-K-MB   | H3080-HG       | 230SM380-MB               | 16X12X630   | 2        | 460            |
| S3080-H-N-FZ-AL-L         | 23080-K-MB   | H3080-HG       | 230SM380-MB               | 16X12X630   | 2        | 460            |
| S3080-H-N-FZ-BF-L         | 23080-K-MB   | H3080-HG       | 230SM380-MB               | 16X12X630   | 4        | 460            |
| S3080-H-N-FZ-BL-L         | 23080-K-MB   | H3080-HG       | 230SM380-MB               | 16X12X630   | 4        | 460            |
| S3084-H-N-FZ-AF-L         | 23084-B-K-MB | H3084X-HG      | 230SM400-MB               | 16X12X660   | 2        | 500            |
| S3084-H-N-FZ-AL-L         | 23084-B-K-MB | H3084X-HG      | 230SM400-MB               | 16X12X660   | 2        | 500            |
| S3084-H-N-FZ-BF-L         | 23084-B-K-MB | H3084X-HG      | 230SM400-MB               | 16X12X660   | 4        | 500            |
| S3084-H-N-FZ-BL-L         | 23084-B-K-MB | H3084X-HG      | 230SM400-MB               | 16X12X660   | 4        | 500            |
| S3088-H-N-FZ-AF-L         | 23088-K-MB   | H3088-HG       | 230SM410-MB               | 16X12X675   | 2        | 600            |
| S3088-H-N-FZ-AL-L         | 23088-K-MB   | H3088-HG       | 230SM410-MB               | 16X12X675   | 2        | 600            |
| S3088-H-N-FZ-BF-L         | 23088-K-MB   | H3088-HG       | 230SM410-MB               | 16X12X675   | 4        | 600            |
| S3088-H-N-FZ-BL-L         | 23088-K-MB   | H3088-HG       | 230SM410-MB               | 16X12X675   | 4        | 600            |
| S3092-H-N-FZ-AF-L         | 23092-B-K-MB | H3092-HG       | -                         | 16X12X710   | 2        | 700            |
| S3092-H-N-FZ-AL-L         | 23092-B-K-MB | H3092-HG       | -                         | 16X12X710   | 2        | 700            |
| S3092-H-N-FZ-BF-L         | 23092-B-K-MB | H3092-HG       | -                         | 16X12X710   | 4        | 700            |
| S3092-H-N-FZ-BL-L         | 23092-B-K-MB | H3092-HG       | -                         | 16X12X710   | 4        | 700            |
| S3096-H-N-FZ-AF-L         | 23096-K-MB   | H3096-HG       | 230SM450-MB <sup>2)</sup> | 16X12X740   | 2        | 800            |
| S3096-H-N-FZ-AL-L         | 23096-K-MB   | H3096-HG       | 230SM450-MB <sup>2)</sup> | 16X12X740   | 2        | 800            |
| S3096-H-N-FZ-BF-L         | 23096-K-MB   | H3096-HG       | 230SM450-MB <sup>2)</sup> | 16X12X740   | 4        | 800            |
| S3096-H-N-FZ-BL-L         | 23096-K-MB   | H3096-HG       | 230SM450-MB <sup>2)</sup> | 16X12X740   | 4        | 800            |

1) Ordering example:

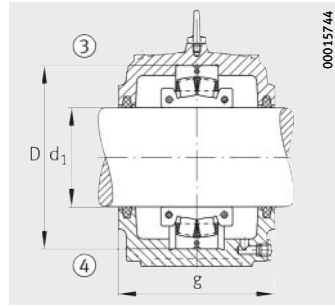
Housing S3080-H-N-FZ-AL-L (see also page 923), bearing 23080-K-MB (see bearing tables), adapter sleeve H3080-HG (see dimension tables).

2) With separate locking rings.

3) ① Locating bearing AF  
 ② Non-locating bearing AL  
 ③ Locating bearing BF  
 ④ Non-locating bearing BL



Design A  
For split bearings



Design B  
For split bearings

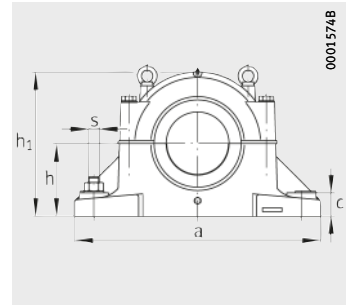
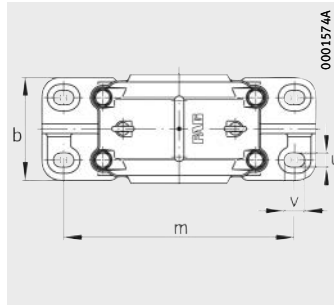
Dimensions

| d <sub>1</sub> | a    | g   | h <sub>1</sub> | b   | c   | D   | g <sub>3</sub> | h   | m    | n   | u  | v  | s   |       |
|----------------|------|-----|----------------|-----|-----|-----|----------------|-----|------|-----|----|----|-----|-------|
|                |      |     |                |     |     |     |                |     |      |     |    |    | mm  | inch  |
| 340            | 1060 | 345 | 655            | 280 | 95  | 540 | 30             | 320 | 900  | 140 | 42 | 50 | M36 | 1 3/8 |
| 340            | 1060 | 345 | 655            | 280 | 95  | 540 | 30             | 320 | 900  | 140 | 42 | 50 | M36 | 1 3/8 |
| 340            | 1060 | 345 | 655            | 280 | 95  | 540 | -              | 320 | 900  | 140 | 42 | 50 | M36 | 1 3/8 |
| 340            | 1060 | 345 | 655            | 280 | 95  | 540 | -              | 320 | 900  | 140 | 42 | 50 | M36 | 1 3/8 |
| 360            | 1060 | 380 | 675            | 280 | 100 | 560 | 30             | 330 | 900  | 140 | 42 | 50 | M36 | 1 3/8 |
| 360            | 1060 | 380 | 675            | 280 | 100 | 560 | 30             | 330 | 900  | 140 | 42 | 50 | M36 | 1 3/8 |
| 360            | 1060 | 380 | 675            | 280 | 100 | 560 | -              | 330 | 900  | 140 | 42 | 50 | M36 | 1 3/8 |
| 360            | 1060 | 380 | 675            | 280 | 100 | 560 | -              | 330 | 900  | 140 | 42 | 50 | M36 | 1 3/8 |
| 380            | 1100 | 400 | 715            | 325 | 120 | 600 | 30             | 350 | 950  | 160 | 42 | 50 | M36 | 1 3/8 |
| 380            | 1100 | 400 | 715            | 325 | 120 | 600 | 30             | 350 | 950  | 160 | 42 | 50 | M36 | 1 3/8 |
| 380            | 1100 | 400 | 715            | 325 | 120 | 600 | -              | 350 | 950  | 160 | 42 | 50 | M36 | 1 3/8 |
| 380            | 1100 | 400 | 715            | 325 | 120 | 600 | -              | 350 | 950  | 160 | 42 | 50 | M36 | 1 3/8 |
| 400            | 1160 | 430 | 750            | 340 | 120 | 620 | 30             | 375 | 980  | 170 | 42 | 50 | M36 | 1 3/8 |
| 400            | 1160 | 430 | 750            | 340 | 120 | 620 | 30             | 375 | 980  | 170 | 42 | 50 | M36 | 1 3/8 |
| 400            | 1160 | 430 | 750            | 340 | 120 | 620 | -              | 375 | 980  | 170 | 42 | 50 | M36 | 1 3/8 |
| 400            | 1160 | 430 | 750            | 340 | 120 | 620 | -              | 375 | 980  | 170 | 42 | 50 | M36 | 1 3/8 |
| 410            | 1200 | 430 | 780            | 340 | 125 | 650 | 30             | 390 | 1020 | 170 | 42 | 50 | M36 | 1 3/8 |
| 410            | 1200 | 430 | 780            | 340 | 125 | 650 | 30             | 390 | 1020 | 170 | 42 | 50 | M36 | 1 3/8 |
| 410            | 1200 | 430 | 780            | 340 | 125 | 650 | -              | 390 | 1020 | 170 | 42 | 50 | M36 | 1 3/8 |
| 410            | 1200 | 430 | 780            | 340 | 125 | 650 | -              | 390 | 1020 | 170 | 42 | 50 | M36 | 1 3/8 |
| 430            | 1260 | 440 | 805            | 360 | 130 | 680 | 30             | 400 | 1080 | 180 | 56 | 75 | M48 | 1 7/8 |
| 430            | 1260 | 440 | 805            | 360 | 130 | 680 | 30             | 400 | 1080 | 180 | 56 | 75 | M48 | 1 7/8 |
| 430            | 1260 | 440 | 805            | 360 | 130 | 680 | -              | 400 | 1080 | 180 | 56 | 75 | M48 | 1 7/8 |
| 430            | 1260 | 440 | 805            | 360 | 130 | 680 | -              | 400 | 1080 | 180 | 56 | 75 | M48 | 1 7/8 |
| 450            | 1380 | 440 | 825            | 380 | 190 | 700 | 30             | 410 | 1180 | 190 | 56 | 75 | M48 | 1 7/8 |
| 450            | 1380 | 440 | 825            | 380 | 190 | 700 | 30             | 410 | 1180 | 190 | 56 | 75 | M48 | 1 7/8 |
| 450            | 1380 | 440 | 825            | 380 | 190 | 700 | -              | 410 | 1180 | 190 | 56 | 75 | M48 | 1 7/8 |
| 450            | 1380 | 440 | 825            | 380 | 190 | 700 | -              | 410 | 1180 | 190 | 56 | 75 | M48 | 1 7/8 |



# Plummer block housings

SD5, split  
For spherical roller bearings with tapered bore and adapter sleeve



Cross-sections of split bearings see page 977

①, ②, ③, ④<sup>2)</sup>

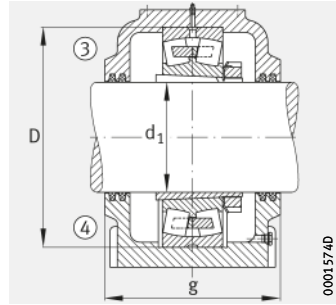
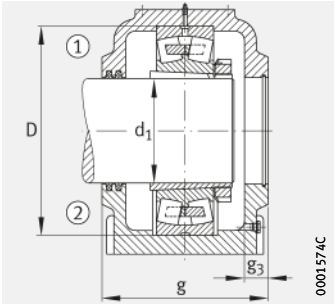
**Dimension table** - Dimensions in mm

| Designation <sup>1)</sup> |              |                |               |             |          | Mass<br>m      |
|---------------------------|--------------|----------------|---------------|-------------|----------|----------------|
| Housing                   | Bearing      | Adapter sleeve | Split bearing | Felt strips |          | Housing<br>≈kg |
|                           |              |                |               | mm          | Quantity |                |
| <b>SD536-N-FZ-AF-L</b>    | 22236-E1-K   | H3136          | –             | 16X12X290   | 4        | 118            |
| <b>SD536-N-FZ-AL-L</b>    | 22236-E1-K   | H3136          | –             | 16X12X290   | 4        | 118            |
| <b>SD536-N-FZ-BF-L</b>    | 22236-E1-K   | H3136          | –             | 16X12X290   | 8        | 118            |
| <b>SD536-N-FZ-BL-L</b>    | 22236-E1-K   | H3136          | –             | 16X12X290   | 8        | 118            |
| <b>SD538-N-FZ-AF-L</b>    | 22238-K-MB   | H3138          | –             | 16X12X305   | 4        | 136            |
| <b>SD538-N-FZ-AL-L</b>    | 22238-K-MB   | H3138          | –             | 16X12X305   | 4        | 136            |
| <b>SD538-N-FZ-BF-L</b>    | 22238-K-MB   | H3138          | –             | 16X12X305   | 8        | 136            |
| <b>SD538-N-FZ-BL-L</b>    | 22238-K-MB   | H3138          | –             | 16X12X305   | 8        | 136            |
| <b>SD540-N-FZ-AF-L</b>    | 22240-B-K-MB | H3140          | 222SM180-MA   | 16X12X320   | 4        | 170            |
| <b>SD540-N-FZ-AL-L</b>    | 22240-B-K-MB | H3140          | 222SM180-MA   | 16X12X320   | 4        | 170            |
| <b>SD540-N-FZ-BF-L</b>    | 22240-B-K-MB | H3140          | 222SM180-MA   | 16X12X320   | 8        | 170            |
| <b>SD540-N-FZ-BL-L</b>    | 22240-B-K-MB | H3140          | 222SM180-MA   | 16X12X320   | 8        | 170            |
| <b>SD544-N-FZ-AF-L</b>    | 22244-B-K-MB | H3144X         | 222SM200-MA   | 16X12X350   | 4        | 216            |
| <b>SD544-N-FZ-AL-L</b>    | 22244-B-K-MB | H3144X         | 222SM200-MA   | 16X12X350   | 4        | 216            |
| <b>SD544-N-FZ-BF-L</b>    | 22244-B-K-MB | H3144X         | 222SM200-MA   | 16X12X350   | 8        | 216            |
| <b>SD544-N-FZ-BL-L</b>    | 22244-B-K-MB | H3144X         | 222SM200-MA   | 16X12X350   | 8        | 216            |
| <b>SD548-N-FZ-AF-L</b>    | 22248-B-K-MB | H3148X         | 222SM220-MA   | 16X12X385   | 4        | 258            |
| <b>SD548-N-FZ-AL-L</b>    | 22248-B-K-MB | H3148X         | 222SM220-MA   | 16X12X385   | 4        | 258            |
| <b>SD548-N-FZ-BF-L</b>    | 22248-B-K-MB | H3148X         | 222SM220-MA   | 16X12X385   | 8        | 258            |
| <b>SD548-N-FZ-BL-L</b>    | 22248-B-K-MB | H3148X         | 222SM220-MA   | 16X12X385   | 8        | 258            |

<sup>1)</sup> Ordering example:  
Housing SD540-N-FZ-BF-L (see also page 925), bearing 22240-B-K-MB (see bearing tables), adapter sleeve H3140 (see dimension tables).

<sup>2)</sup> ① Locating bearing AF  
② Non-locating bearing AL  
③ Locating bearing BF  
④ Non-locating bearing BL





Design A  
Design B  
For bearings with tapered bore and adapter sleeve

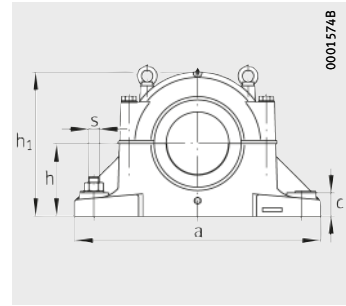
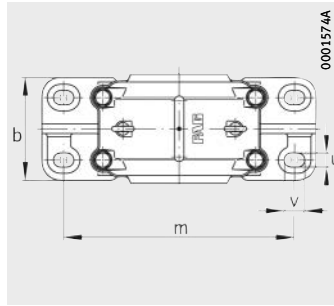
Dimensions

| d <sub>1</sub> | a   | g   | h <sub>1</sub> | b   | c  | D   | g <sub>3</sub> | h   | m   | n   | u  | v  | s   |                               |
|----------------|-----|-----|----------------|-----|----|-----|----------------|-----|-----|-----|----|----|-----|-------------------------------|
|                |     |     |                |     |    |     |                |     |     |     |    |    | mm  | inch                          |
| 160            | 650 | 280 | 380            | 260 | 60 | 320 | 50             | 190 | 540 | 150 | 36 | 50 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 160            | 650 | 280 | 380            | 260 | 60 | 320 | 50             | 190 | 540 | 150 | 36 | 50 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 160            | 650 | 280 | 380            | 260 | 60 | 320 | -              | 190 | 540 | 150 | 36 | 50 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 160            | 650 | 280 | 380            | 260 | 60 | 320 | -              | 190 | 540 | 150 | 36 | 50 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 170            | 700 | 290 | 400            | 280 | 65 | 340 | 50             | 200 | 570 | 160 | 40 | 55 | M33 | 1 <sup>1</sup> / <sub>4</sub> |
| 170            | 700 | 290 | 400            | 280 | 65 | 340 | 50             | 200 | 570 | 160 | 40 | 55 | M33 | 1 <sup>1</sup> / <sub>4</sub> |
| 170            | 700 | 290 | 400            | 280 | 65 | 340 | -              | 200 | 570 | 160 | 40 | 55 | M33 | 1 <sup>1</sup> / <sub>4</sub> |
| 170            | 700 | 290 | 400            | 280 | 65 | 340 | -              | 200 | 570 | 160 | 40 | 55 | M33 | 1 <sup>1</sup> / <sub>4</sub> |
| 180            | 740 | 300 | 420            | 290 | 65 | 360 | 50             | 210 | 610 | 170 | 40 | 55 | M33 | 1 <sup>1</sup> / <sub>4</sub> |
| 180            | 740 | 300 | 420            | 290 | 65 | 360 | 50             | 210 | 610 | 170 | 40 | 55 | M33 | 1 <sup>1</sup> / <sub>4</sub> |
| 180            | 740 | 300 | 420            | 290 | 65 | 360 | -              | 210 | 610 | 170 | 40 | 55 | M33 | 1 <sup>1</sup> / <sub>4</sub> |
| 180            | 740 | 300 | 420            | 290 | 65 | 360 | -              | 210 | 610 | 170 | 40 | 55 | M33 | 1 <sup>1</sup> / <sub>4</sub> |
| 200            | 820 | 330 | 475            | 320 | 70 | 400 | 50             | 240 | 680 | 190 | 42 | 62 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 200            | 820 | 330 | 475            | 320 | 70 | 400 | 50             | 240 | 680 | 190 | 42 | 62 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 200            | 820 | 330 | 475            | 320 | 70 | 400 | -              | 240 | 680 | 190 | 42 | 62 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 200            | 820 | 330 | 475            | 320 | 70 | 400 | -              | 240 | 680 | 190 | 42 | 62 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 220            | 880 | 340 | 515            | 330 | 85 | 440 | 50             | 260 | 740 | 200 | 45 | 65 | M39 | 1 <sup>1</sup> / <sub>2</sub> |
| 220            | 880 | 340 | 515            | 330 | 85 | 440 | 50             | 260 | 740 | 200 | 45 | 65 | M39 | 1 <sup>1</sup> / <sub>2</sub> |
| 220            | 880 | 340 | 515            | 330 | 85 | 440 | -              | 260 | 740 | 200 | 45 | 65 | M39 | 1 <sup>1</sup> / <sub>2</sub> |
| 220            | 880 | 340 | 515            | 330 | 85 | 440 | -              | 260 | 740 | 200 | 45 | 65 | M39 | 1 <sup>1</sup> / <sub>2</sub> |



# Plummer block housings

SD5, split  
For spherical roller bearings with tapered bore and adapter sleeve



Cross-sections of unsplit bearings see page 975

①, ②, ③, ④<sup>2)</sup>

**Dimension table** (continued) · Dimensions in mm

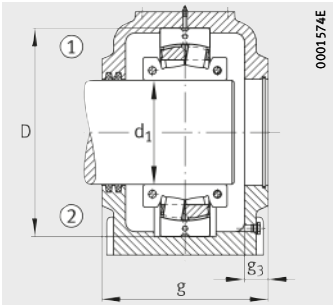
| Designation <sup>1)</sup> |              |                |               |             |          | Mass<br>m      |
|---------------------------|--------------|----------------|---------------|-------------|----------|----------------|
| Housing                   | Bearing      | Adapter sleeve | Split bearing | Felt strips |          | Housing<br>≈kg |
|                           |              |                |               | mm          | Quantity |                |
| <b>SD552-N-FZ-AF-L</b>    | 22252-B-K-MB | H3152X         | 222SM240-MA   | 16X12X415   | 4        | 323            |
| <b>SD552-N-FZ-AL-L</b>    | 22252-B-K-MB | H3152X         | 222SM240-MA   | 16X12X415   | 4        | 323            |
| <b>SD552-N-FZ-BF-L</b>    | 22252-B-K-MB | H3152X         | 222SM240-MA   | 16X12X415   | 8        | 323            |
| <b>SD552-N-FZ-BL-L</b>    | 22252-B-K-MB | H3152X         | 222SM240-MA   | 16X12X415   | 8        | 323            |
| <b>SD556-N-FZ-AF-L</b>    | 22256-B-K-MB | H3156X         | 222SM260-MA   | 16X12X445   | 4        | 404            |
| <b>SD556-N-FZ-AL-L</b>    | 22256-B-K-MB | H3156X         | 222SM260-MA   | 16X12X445   | 4        | 404            |
| <b>SD556-N-FZ-BF-L</b>    | 22256-B-K-MB | H3156X         | 222SM260-MA   | 16X12X445   | 8        | 404            |
| <b>SD556-N-FZ-BL-L</b>    | 22256-B-K-MB | H3156X         | 222SM260-MA   | 16X12X445   | 8        | 404            |
| <b>SD560-N-FZ-AF-L</b>    | 22260-K-MB   | H3160          | 222SM280-MA   | 16X12X480   | 4        | 480            |
| <b>SD560-N-FZ-AL-L</b>    | 22260-K-MB   | H3160          | 222SM280-MA   | 16X12X480   | 4        | 480            |
| <b>SD560-N-FZ-BF-L</b>    | 22260-K-MB   | H3160          | 222SM280-MA   | 16X12X480   | 8        | 480            |
| <b>SD560-N-FZ-BL-L</b>    | 22260-K-MB   | H3160          | 222SM280-MA   | 16X12X480   | 8        | 480            |
| <b>SD564-N-FZ-AF-L</b>    | 22264-K-MB   | H3164          | 222SM300-MA   | 16X12X510   | 4        | 605            |
| <b>SD564-N-FZ-AL-L</b>    | 22264-K-MB   | H3164          | 222SM300-MA   | 16X12X510   | 4        | 605            |
| <b>SD564-N-FZ-BF-L</b>    | 22264-K-MB   | H3164          | 222SM300-MA   | 16X12X510   | 8        | 605            |
| <b>SD564-N-FZ-BL-L</b>    | 22264-K-MB   | H3164          | 222SM300-MA   | 16X12X510   | 8        | 605            |

<sup>1)</sup> Ordering example:

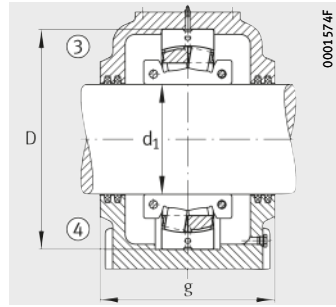
Housing SD556-N-FZ-BF-L (see also page 925), bearing 22256-B-K-MB (see bearing tables), adapter sleeve H3156X (see dimension tables).

<sup>2)</sup>

- ① Locating bearing AF
- ② Non-locating bearing AL
- ③ Locating bearing BF
- ④ Non-locating bearing BL



Design A  
For split bearings



Design B  
For split bearings

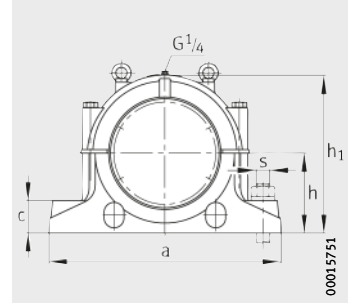
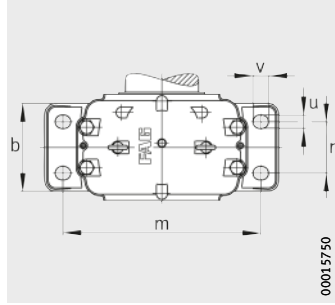
Dimensions

| d <sub>1</sub> | a    | g   | h <sub>1</sub> | b   | c   | D   | g <sub>3</sub> | h   | m   | n   | u  | v  | s   |                               |
|----------------|------|-----|----------------|-----|-----|-----|----------------|-----|-----|-----|----|----|-----|-------------------------------|
|                |      |     |                |     |     |     |                |     |     |     |    |    | mm  | inch                          |
| <b>240</b>     | 940  | 370 | 555            | 360 | 85  | 480 | 50             | 280 | 790 | 210 | 45 | 65 | M39 | 1 <sup>1</sup> / <sub>2</sub> |
| <b>240</b>     | 940  | 370 | 555            | 360 | 85  | 480 | 50             | 280 | 790 | 210 | 45 | 65 | M39 | 1 <sup>1</sup> / <sub>2</sub> |
| <b>240</b>     | 940  | 370 | 555            | 360 | 85  | 480 | –              | 280 | 790 | 210 | 45 | 65 | M39 | 1 <sup>1</sup> / <sub>2</sub> |
| <b>240</b>     | 940  | 370 | 555            | 360 | 85  | 480 | –              | 280 | 790 | 210 | 45 | 65 | M39 | 1 <sup>1</sup> / <sub>2</sub> |
| <b>260</b>     | 990  | 390 | 590            | 380 | 100 | 500 | 50             | 300 | 830 | 230 | 52 | 77 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| <b>260</b>     | 990  | 390 | 590            | 380 | 100 | 500 | 50             | 300 | 830 | 230 | 52 | 77 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| <b>260</b>     | 990  | 390 | 590            | 380 | 100 | 500 | –              | 300 | 830 | 230 | 52 | 77 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| <b>260</b>     | 990  | 390 | 590            | 380 | 100 | 500 | –              | 300 | 830 | 230 | 52 | 77 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| <b>280</b>     | 1060 | 410 | 640            | 400 | 100 | 540 | 50             | 325 | 890 | 250 | 52 | 77 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| <b>280</b>     | 1060 | 410 | 640            | 400 | 100 | 540 | 50             | 325 | 890 | 250 | 52 | 77 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| <b>280</b>     | 1060 | 410 | 640            | 400 | 100 | 540 | –              | 325 | 890 | 250 | 52 | 77 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| <b>280</b>     | 1060 | 410 | 640            | 400 | 100 | 540 | –              | 325 | 890 | 250 | 52 | 77 | M45 | 1 <sup>3</sup> / <sub>4</sub> |
| <b>300</b>     | 1110 | 440 | 690            | 430 | 110 | 580 | 50             | 355 | 930 | 270 | 56 | 85 | M48 | 2                             |
| <b>300</b>     | 1110 | 440 | 690            | 430 | 110 | 580 | 50             | 355 | 930 | 270 | 56 | 85 | M48 | 2                             |
| <b>300</b>     | 1110 | 440 | 690            | 430 | 110 | 580 | –              | 355 | 930 | 270 | 56 | 85 | M48 | 2                             |
| <b>300</b>     | 1110 | 440 | 690            | 430 | 110 | 580 | –              | 355 | 930 | 270 | 56 | 85 | M48 | 2                             |



# Plummer block housings

SD31, split  
For spherical roller bearings with tapered bore and adapter sleeve

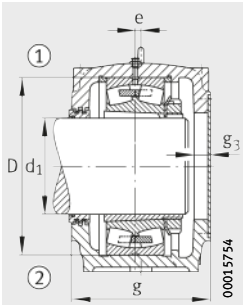


Cross-section of split bearings see page 981

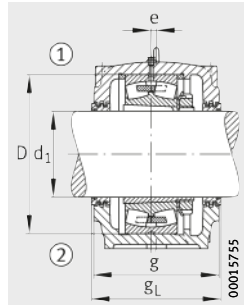
Dimension table - Dimensions in mm

| Designation <sup>1)</sup> |               |                |               |               |          |                                |          | Mass<br>m      |
|---------------------------|---------------|----------------|---------------|---------------|----------|--------------------------------|----------|----------------|
| Housing                   | Bearing       | Adapter sleeve | Split bearing | Locating ring |          | Labyrinth ring with round cord |          | Housing<br>≈kg |
|                           |               |                |               |               | Quantity |                                | Quantity |                |
| SD3138-H-TS-A-L           | 23138-E1A-K-M | H3138          | 231SM170-MA   | FRM320/10     | 2        | TS38                           | 1        | 95             |
| SD3138-H-TS-B-L           | 23138-E1A-K-M | H3138          | 231SM170-MA   | FRM320/10     | 2        | TS38                           | 2        | 95             |
| SD3140-H-TS-A-L           | 23140-B-K-MB  | H3140          | 231SM180-MA   | FRM340/10     | 2        | TS40                           | 1        | 120            |
| SD3140-H-TS-B-L           | 23140-B-K-MB  | H3140          | 231SM180-MA   | FRM340/10     | 2        | TS40                           | 2        | 120            |
| SD3144-H-TS-AF-L          | 23144-B-K-MB  | H3144X         | 231SM200-MA   | -             | -        | TS44                           | 1        | 135            |
| SD3144-H-TS-AL-L          | 23144-B-K-MB  | H3144X         | 231SM200-MA   | -             | -        | TS44                           | 1        | 135            |
| SD3144-H-TS-BF-L          | 23144-B-K-MB  | H3144X         | 231SM200-MA   | -             | -        | TS44                           | 2        | 135            |
| SD3144-H-TS-BL-L          | 23144-B-K-MB  | H3144X         | 231SM200-MA   | -             | -        | TS44                           | 2        | 135            |
| SD3148-H-TS-AF-L          | 23148-B-K-MB  | H3148X         | 231SM220-MA   | -             | -        | TS48                           | 1        | 175            |
| SD3148-H-TS-AL-L          | 23148-B-K-MB  | H3148X         | 231SM220-MA   | -             | -        | TS48                           | 1        | 175            |
| SD3148-H-TS-BF-L          | 23148-B-K-MB  | H3148X         | 231SM220-MA   | -             | -        | TS48                           | 2        | 175            |
| SD3148-H-TS-BL-L          | 23148-B-K-MB  | H3148X         | 231SM220-MA   | -             | -        | TS48                           | 2        | 175            |
| SD3152-H-TS-AF-L          | 23152-K-MB    | H3152X         | 231SM240-MA   | -             | -        | TS52                           | 1        | 210            |
| SD3152-H-TS-AL-L          | 23152-K-MB    | H3152X         | 231SM240-MA   | -             | -        | TS52                           | 1        | 210            |
| SD3152-H-TS-BF-L          | 23152-K-MB    | H3152X         | 231SM240-MA   | -             | -        | TS52                           | 2        | 210            |
| SD3152-H-TS-BL-L          | 23152-K-MB    | H3152X         | 231SM240-MA   | -             | -        | TS52                           | 2        | 210            |
| SD3156-H-TS-AF-L          | 23156-B-K-MB  | H3156X         | 231SM260-MA   | -             | -        | TS56                           | 1        | 240            |
| SD3156-H-TS-AL-L          | 23156-B-K-MB  | H3156X         | 231SM260-MA   | -             | -        | TS56                           | 1        | 240            |
| SD3156-H-TS-BF-L          | 23156-B-K-MB  | H3156X         | 231SM260-MA   | -             | -        | TS56                           | 2        | 240            |
| SD3156-H-TS-BL-L          | 23156-B-K-MB  | H3156X         | 231SM260-MA   | -             | -        | TS56                           | 2        | 240            |
| SD3160-H-TS-AF-L          | 23160-B-K-MB  | H3160-HG       | 231SM280-MA   | -             | -        | TS60                           | 1        | 290            |
| SD3160-H-TS-AL-L          | 23160-B-K-MB  | H3160-HG       | 231SM280-MA   | -             | -        | TS60                           | 1        | 290            |
| SD3160-H-TS-BF-L          | 23160-B-K-MB  | H3160-HG       | 231SM280-MA   | -             | -        | TS60                           | 2        | 290            |
| SD3160-H-TS-BL-L          | 23160-B-K-MB  | H3160-HG       | 231SM280-MA   | -             | -        | TS60                           | 2        | 290            |
| SD3164-H-TS-AF-L          | 23164-K-MB    | H3164-HG       | 231SM300-MA   | -             | -        | TS64                           | 1        | 330            |
| SD3164-H-TS-AL-L          | 23164-K-MB    | H3164-HG       | 231SM300-MA   | -             | -        | TS64                           | 1        | 330            |
| SD3164-H-TS-BF-L          | 23164-K-MB    | H3164-HG       | 231SM300-MA   | -             | -        | TS64                           | 2        | 330            |
| SD3164-H-TS-BL-L          | 23164-K-MB    | H3164-HG       | 231SM300-MA   | -             | -        | TS64                           | 2        | 330            |
| SD3168-H-TS-AF-L          | 23168-B-K-MB  | H3168-HG       | 231SM320-MA   | -             | -        | TS68                           | 1        | 380            |
| SD3168-H-TS-AL-L          | 23168-B-K-MB  | H3168-HG       | 231SM320-MA   | -             | -        | TS68                           | 1        | 380            |
| SD3168-H-TS-BF-L          | 23168-B-K-MB  | H3168-HG       | 231SM320-MA   | -             | -        | TS68                           | 2        | 380            |
| SD3168-H-TS-BL-L          | 23168-B-K-MB  | H3168-HG       | 231SM320-MA   | -             | -        | TS68                           | 2        | 380            |

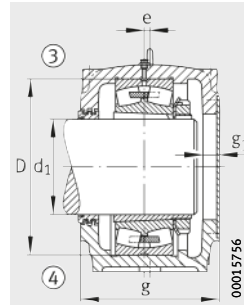
<sup>1)</sup> Ordering example:  
Housing SD3164-H-TS-BL-L (see also page 928), bearing 23164-K-MB (see bearing tables), adapter sleeve H3164-HG (see dimension tables).



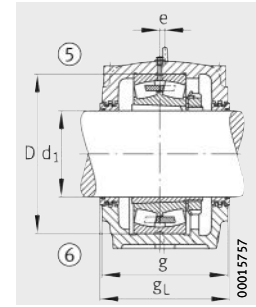
Design A (TS-A)  
 ① Locating bearing  
 ② Non-locating bearing



Design B (TS-B)  
 ① Locating bearing  
 ② Non-locating bearing



Design A  
 ③ Loc. brg. TS-AF  
 ④ Non-loc. brg. TS-AL



Design B  
 ⑤ Loc. brg. TS-BF  
 ⑥ Non-loc. brg. TS-BL

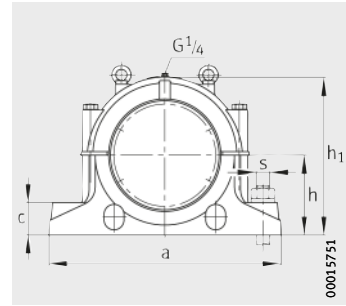
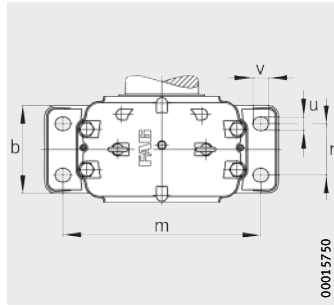
### Dimensions

| d <sub>1</sub> | a   | g   | h <sub>1</sub> | b   | c   | D   | e  | g <sub>L</sub> | g <sub>3</sub> | h   | m   | n   | u  | v  | s   |                               |
|----------------|-----|-----|----------------|-----|-----|-----|----|----------------|----------------|-----|-----|-----|----|----|-----|-------------------------------|
|                |     |     |                |     |     |     |    |                |                |     |     |     |    |    | mm  | inch                          |
| 170            | 560 | 260 | 375            | 210 | 80  | 320 | 10 | -              | 35             | 190 | 480 | 120 | 30 | 36 | M24 | 1                             |
| 170            | 560 | 260 | 375            | 210 | 80  | 320 | 10 | 270            | -              | 190 | 480 | 120 | 30 | 36 | M24 | 1                             |
| 180            | 610 | 280 | 410            | 230 | 85  | 340 | 10 | -              | 35             | 210 | 510 | 130 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 180            | 610 | 280 | 410            | 230 | 85  | 340 | 10 | 290            | -              | 210 | 510 | 130 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 200            | 640 | 290 | 435            | 240 | 90  | 370 | 12 | -              | 35             | 220 | 540 | 140 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 200            | 640 | 290 | 435            | 240 | 90  | 370 | 12 | -              | 35             | 220 | 540 | 140 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 200            | 640 | 290 | 435            | 240 | 90  | 370 | 12 | 300            | -              | 220 | 540 | 140 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 200            | 640 | 290 | 435            | 240 | 90  | 370 | 12 | 300            | -              | 220 | 540 | 140 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 220            | 700 | 310 | 475            | 260 | 95  | 400 | 12 | -              | 35             | 240 | 600 | 150 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 220            | 700 | 310 | 475            | 260 | 95  | 400 | 12 | -              | 35             | 240 | 600 | 150 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 220            | 700 | 310 | 475            | 260 | 95  | 400 | 12 | 320            | -              | 240 | 600 | 150 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 220            | 700 | 310 | 475            | 260 | 95  | 400 | 12 | 320            | -              | 240 | 600 | 150 | 36 | 42 | M30 | 1 <sup>1</sup> / <sub>8</sub> |
| 240            | 770 | 320 | 515            | 280 | 100 | 440 | 13 | -              | 35             | 260 | 650 | 160 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 240            | 770 | 320 | 515            | 280 | 100 | 440 | 13 | -              | 35             | 260 | 650 | 160 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 240            | 770 | 320 | 515            | 280 | 100 | 440 | 13 | 330            | -              | 260 | 650 | 160 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 240            | 770 | 320 | 515            | 280 | 100 | 440 | 13 | 330            | -              | 260 | 650 | 160 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 260            | 790 | 320 | 550            | 280 | 105 | 460 | 16 | -              | 35             | 280 | 670 | 160 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 260            | 790 | 320 | 550            | 280 | 105 | 460 | 16 | -              | 35             | 280 | 670 | 160 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 260            | 790 | 320 | 550            | 280 | 105 | 460 | 16 | 330            | -              | 280 | 670 | 160 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 260            | 790 | 320 | 550            | 280 | 105 | 460 | 16 | 330            | -              | 280 | 670 | 160 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 280            | 830 | 350 | 590            | 310 | 110 | 500 | 22 | -              | 35             | 300 | 710 | 190 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 280            | 830 | 350 | 590            | 310 | 110 | 500 | 22 | -              | 35             | 300 | 710 | 190 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 280            | 830 | 350 | 590            | 310 | 110 | 500 | 22 | 360            | -              | 300 | 710 | 190 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 280            | 830 | 350 | 590            | 310 | 110 | 500 | 22 | 360            | -              | 300 | 710 | 190 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 300            | 880 | 370 | 630            | 330 | 115 | 540 | 23 | -              | 35             | 320 | 750 | 200 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 300            | 880 | 370 | 630            | 330 | 115 | 540 | 23 | -              | 35             | 320 | 750 | 200 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 300            | 880 | 370 | 630            | 330 | 115 | 540 | 23 | 380            | -              | 320 | 750 | 200 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 300            | 880 | 370 | 630            | 330 | 115 | 540 | 23 | 380            | -              | 320 | 750 | 200 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 320            | 950 | 400 | 675            | 360 | 120 | 580 | 24 | -              | 35             | 340 | 810 | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 320            | 950 | 400 | 675            | 360 | 120 | 580 | 24 | -              | 35             | 340 | 810 | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 320            | 950 | 400 | 675            | 360 | 120 | 580 | 24 | 410            | -              | 340 | 810 | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 320            | 950 | 400 | 675            | 360 | 120 | 580 | 24 | 410            | -              | 340 | 810 | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |



# Plummer block housings

SD31, split  
For spherical roller bearings with tapered bore and adapter sleeve



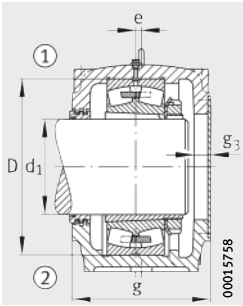
**Dimension table** (continued) · Dimensions in mm

| Designation <sup>1)</sup> |              |                |                           |                                |          | Mass<br>m<br>Housing<br>≈kg |
|---------------------------|--------------|----------------|---------------------------|--------------------------------|----------|-----------------------------|
| Housing                   | Bearing      | Adapter sleeve | Split bearing             | Labyrinth ring with round cord |          |                             |
|                           |              |                |                           |                                | Quantity |                             |
| SD3172-H-TS-AF-L          | 23172-K-MB   | H3172-HG       | 231SM340-MA               | TS72                           | 1        | 420                         |
| SD3172-H-TS-AL-L          | 23172-K-MB   | H3172-HG       | 231SM340-MA               | TS72                           | 1        | 420                         |
| SD3172-H-TS-BF-L          | 23172-K-MB   | H3172-HG       | 231SM340-MA               | TS72                           | 2        | 420                         |
| SD3172-H-TS-BL-L          | 23172-K-MB   | H3172-HG       | 231SM340-MA               | TS72                           | 2        | 420                         |
| SD3176-H-TS-AF-L          | 23176-K-MB   | H3176-HG       | 231SM360-MA               | TS76                           | 1        | 490                         |
| SD3176-H-TS-AL-L          | 23176-K-MB   | H3176-HG       | 231SM360-MA               | TS76                           | 1        | 490                         |
| SD3176-H-TS-BF-L          | 23176-K-MB   | H3176-HG       | 231SM360-MA               | TS76                           | 2        | 490                         |
| SD3176-H-TS-BL-L          | 23176-K-MB   | H3176-HG       | 231SM360-MA               | TS76                           | 2        | 490                         |
| SD3180-H-TS-AF-L          | 23180-B-K-MB | H3180-HG       | 231SM380-MA               | TS80                           | 1        | 570                         |
| SD3180-H-TS-AL-L          | 23180-B-K-MB | H3180-HG       | 231SM380-MA               | TS80                           | 1        | 570                         |
| SD3180-H-TS-BF-L          | 23180-B-K-MB | H3180-HG       | 231SM380-MA               | TS80                           | 2        | 570                         |
| SD3180-H-TS-BL-L          | 23180-B-K-MB | H3180-HG       | 231SM380-MA               | TS80                           | 2        | 570                         |
| SD3184-H-TS-AF-L          | 23184-K-MB   | H3184-HG       | 231SM400-MA               | TS84                           | 1        | 610                         |
| SD3184-H-TS-AL-L          | 23184-K-MB   | H3184-HG       | 231SM400-MA               | TS84                           | 1        | 610                         |
| SD3184-H-TS-BF-L          | 23184-K-MB   | H3184-HG       | 231SM400-MA               | TS84                           | 2        | 610                         |
| SD3184-H-TS-BL-L          | 23184-K-MB   | H3184-HG       | 231SM400-MA               | TS84                           | 2        | 610                         |
| SD3188-H-TS-AF-L          | 23188-K-MB   | H3188-HG       | 231SM410-MA <sup>2)</sup> | TS88                           | 1        | 770                         |
| SD3188-H-TS-AL-L          | 23188-K-MB   | H3188-HG       | 231SM410-MA <sup>2)</sup> | TS88                           | 1        | 770                         |
| SD3188-H-TS-BF-L          | 23188-K-MB   | H3188-HG       | 231SM410-MA <sup>2)</sup> | TS88                           | 2        | 770                         |
| SD3188-H-TS-BL-L          | 23188-K-MB   | H3188-HG       | 231SM410-MA <sup>2)</sup> | TS88                           | 2        | 770                         |
| SD3192-H-TS-AF-L          | 23192-K-MB   | H3192-HG       | 231SM430-MA <sup>2)</sup> | TS92                           | 1        | 830                         |
| SD3192-H-TS-AL-L          | 23192-K-MB   | H3192-HG       | 231SM430-MA <sup>2)</sup> | TS92                           | 1        | 830                         |
| SD3192-H-TS-BF-L          | 23192-K-MB   | H3192-HG       | 231SM430-MA <sup>2)</sup> | TS92                           | 2        | 830                         |
| SD3192-H-TS-BL-L          | 23192-K-MB   | H3192-HG       | 231SM430-MA <sup>2)</sup> | TS92                           | 2        | 830                         |
| SD3196-H-TS-AF-L          | 23196-K-MB   | H3196-HG       | –                         | TS96                           | 1        | 930                         |
| SD3196-H-TS-AL-L          | 23196-K-MB   | H3196-HG       | –                         | TS96                           | 1        | 930                         |
| SD3196-H-TS-BF-L          | 23196-K-MB   | H3196-HG       | –                         | TS96                           | 2        | 930                         |
| SD3196-H-TS-BL-L          | 23196-K-MB   | H3196-HG       | –                         | TS96                           | 2        | 930                         |

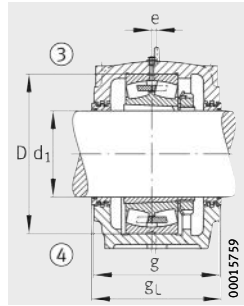
<sup>1)</sup> Ordering example:  
Housing SD3188-H-TS-BL-L (see also page 928), bearing 23188-K-MB (see bearing tables), adapter sleeve H3188-HG (see dimension tables).

<sup>2)</sup> With separate locking rings.

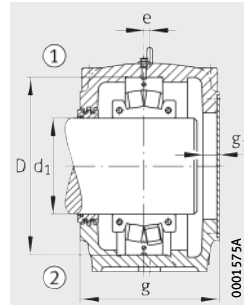
<sup>3)</sup> With split bearings.



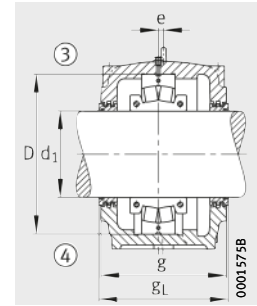
Design A  
 ① Loc. brg. TS-AF  
 ② Non-loc. brg. TS-AL



Design B  
 ③ Loc. brg. TS-BF  
 ④ Non-loc. brg. TS-BL



Design A<sup>3)</sup>  
 ① Loc. brg. TS-AF  
 ② Non-loc. brg. TS-AL



Design B<sup>3)</sup>  
 ③ Loc. brg. TS-BF  
 ④ Non-loc. brg. TS-BL

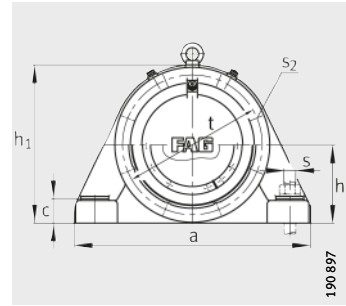
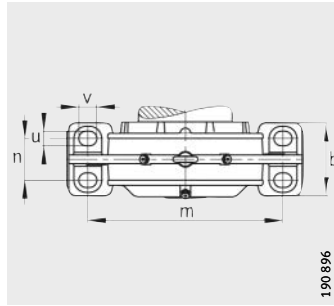
Dimensions

| d <sub>1</sub> | a     | g   | h <sub>1</sub> | b   | c   | D   | e  | g <sub>L</sub> | g <sub>3</sub> | h   | m     | n   | u  | v  | s   |                               |
|----------------|-------|-----|----------------|-----|-----|-----|----|----------------|----------------|-----|-------|-----|----|----|-----|-------------------------------|
|                |       |     |                |     |     |     |    |                |                |     |       |     |    |    | mm  | inch                          |
| 340            | 1 000 | 400 | 695            | 360 | 120 | 600 | 30 | -              | 35             | 350 | 840   | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 340            | 1 000 | 400 | 695            | 360 | 120 | 600 | 30 | -              | 35             | 350 | 840   | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 340            | 1 000 | 400 | 695            | 360 | 120 | 600 | 30 | 410            | -              | 350 | 840   | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 340            | 1 000 | 400 | 695            | 360 | 120 | 600 | 30 | 410            | -              | 350 | 840   | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 360            | 1 040 | 400 | 715            | 360 | 120 | 620 | 30 | -              | 35             | 360 | 870   | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 360            | 1 040 | 400 | 715            | 360 | 120 | 620 | 30 | -              | 35             | 360 | 870   | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 360            | 1 040 | 400 | 715            | 360 | 120 | 620 | 30 | 410            | -              | 360 | 870   | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 360            | 1 040 | 400 | 715            | 360 | 120 | 620 | 30 | 410            | -              | 360 | 870   | 220 | 42 | 52 | M36 | 1 <sup>3</sup> / <sub>8</sub> |
| 380            | 1 120 | 430 | 755            | 390 | 125 | 650 | 30 | -              | 35             | 380 | 950   | 240 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 380            | 1 120 | 430 | 755            | 390 | 125 | 650 | 30 | -              | 35             | 380 | 950   | 240 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 380            | 1 120 | 430 | 755            | 390 | 125 | 650 | 30 | 440            | -              | 380 | 950   | 240 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 380            | 1 120 | 430 | 755            | 390 | 125 | 650 | 30 | 440            | -              | 380 | 950   | 240 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 400            | 1 170 | 460 | 810            | 420 | 130 | 700 | 35 | -              | 35             | 410 | 1 000 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 400            | 1 170 | 460 | 810            | 420 | 130 | 700 | 35 | -              | 35             | 410 | 1 000 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 400            | 1 170 | 460 | 810            | 420 | 130 | 700 | 35 | 470            | -              | 410 | 1 000 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 400            | 1 170 | 460 | 810            | 420 | 130 | 700 | 35 | 470            | -              | 410 | 1 000 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 410            | 1 220 | 460 | 835            | 430 | 135 | 720 | 35 | -              | 35             | 420 | 1 030 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 410            | 1 220 | 460 | 835            | 430 | 135 | 720 | 35 | -              | 35             | 420 | 1 030 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 410            | 1 220 | 460 | 835            | 430 | 135 | 720 | 35 | 470            | -              | 420 | 1 030 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 410            | 1 220 | 460 | 835            | 430 | 135 | 720 | 35 | 470            | -              | 420 | 1 030 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 430            | 1 280 | 470 | 875            | 440 | 145 | 760 | 35 | -              | 35             | 440 | 1 070 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 430            | 1 280 | 470 | 875            | 440 | 145 | 760 | 35 | -              | 35             | 440 | 1 070 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 430            | 1 280 | 470 | 875            | 440 | 145 | 760 | 35 | 480            | -              | 440 | 1 070 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 430            | 1 280 | 470 | 875            | 440 | 145 | 760 | 35 | 480            | -              | 440 | 1 070 | 260 | 48 | 60 | M42 | 1 <sup>5</sup> / <sub>8</sub> |
| 450            | 1 330 | 470 | 920            | 440 | 155 | 790 | 45 | -              | 35             | 460 | 1 110 | 260 | 66 | 80 | M56 | 2 <sup>1</sup> / <sub>4</sub> |
| 450            | 1 330 | 470 | 920            | 440 | 155 | 790 | 45 | -              | 35             | 460 | 1 110 | 260 | 66 | 80 | M56 | 2 <sup>1</sup> / <sub>4</sub> |
| 450            | 1 330 | 470 | 920            | 440 | 155 | 790 | 45 | 480            | -              | 460 | 1 110 | 260 | 66 | 80 | M56 | 2 <sup>1</sup> / <sub>4</sub> |
| 450            | 1 330 | 470 | 920            | 440 | 155 | 790 | 45 | 480            | -              | 460 | 1 110 | 260 | 66 | 80 | M56 | 2 <sup>1</sup> / <sub>4</sub> |



# Plummer block housings

BND, unsplit  
 For spherical roller bearings with cylindrical bore, with tapered bore and adapter sleeve



Cross-sections of bearings with tapered bore see page 985 and page 987

①, ②, ③, ④<sup>2)</sup>

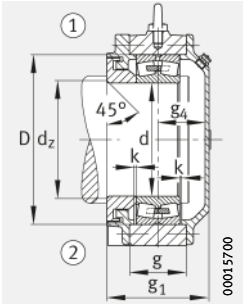
**Dimension table** - Dimensions in mm

| Designation <sup>1)</sup> |         |                | Mass<br>m<br>≈kg | Dimensions |     |                |     |                |                |    |     |     |                        |
|---------------------------|---------|----------------|------------------|------------|-----|----------------|-----|----------------|----------------|----|-----|-----|------------------------|
| Housing                   | Bearing | Adapter sleeve |                  | Housing    | d   | d <sub>1</sub> | a   | g <sub>1</sub> | h <sub>1</sub> | b  | c   | D   | d <sub>c</sub><br>min. |
| <b>BND2236</b>            | 22236-  | H3136          | 130              | <b>180</b> | 160 | 680            | 214 | 425            | 210            | 65 | 320 | 176 | 196                    |
| <b>BND3236</b>            | 23236-  | H2336          | 140              | <b>180</b> | 160 | 680            | 240 | 425            | 210            | 65 | 320 | 176 | 196                    |
| <b>BND3138</b>            | 23138-  | H3138          | 125              | <b>190</b> | 170 | 680            | 232 | 425            | 210            | 65 | 320 | 182 | 202                    |
| <b>BND2238</b>            | 22238-  | H3138          | 170              | <b>190</b> | 170 | 710            | 222 | 455            | 220            | 85 | 340 | 186 | 206                    |
| <b>BND3238</b>            | 23228-  | H2338          | 170              | <b>190</b> | 170 | 710            | 250 | 455            | 220            | 85 | 340 | 186 | 206                    |
| <b>BND3140</b>            | 23140-  | H3140          | 170              | <b>200</b> | 180 | 710            | 242 | 455            | 220            | 85 | 340 | 192 | 212                    |
| <b>BND2240</b>            | 22240-  | H3140          | 185              | <b>200</b> | 180 | 780            | 230 | 475            | 240            | 75 | 360 | 196 | 216                    |
| <b>BND3240</b>            | 23240-  | H2340          | 205              | <b>200</b> | 180 | 780            | 260 | 475            | 240            | 75 | 360 | 196 | 216                    |
| <b>BND3044</b>            | 23044-  | H3044X         | 100              | <b>220</b> | 200 | 640            | 206 | 430            | 200            | 65 | 340 | 212 | 232                    |
| <b>BND3144</b>            | 23144-  | H3144X         | 190              | <b>220</b> | 200 | 780            | 252 | 475            | 240            | 75 | 370 | 216 | 236                    |
| <b>BND2244</b>            | 22244-  | H3144X         | 290              | <b>220</b> | 200 | 890            | 264 | 550            | 250            | 80 | 400 | 216 | 236                    |
| <b>BND3244</b>            | 23244-  | H2344X         | 240              | <b>220</b> | 200 | 850            | 279 | 525            | 250            | 80 | 400 | 216 | 236                    |
| <b>BND3048</b>            | 23048-  | H3048          | 130              | <b>240</b> | 220 | 680            | 216 | 455            | 210            | 70 | 360 | 232 | 252                    |
| <b>BND3148</b>            | 23148-  | H3148X         | 280              | <b>240</b> | 220 | 890            | 284 | 550            | 250            | 80 | 400 | 236 | 256                    |
| <b>BND2248</b>            | 22248-  | H3148X         | 315              | <b>240</b> | 220 | 900            | 268 | 585            | 250            | 90 | 440 | 236 | 256                    |
| <b>BND3248</b>            | 23248-  | H2348X         | 330              | <b>240</b> | 220 | 900            | 308 | 585            | 250            | 90 | 440 | 236 | 256                    |
| <b>BND3052</b>            | 23052-  | H3052X         | 160              | <b>260</b> | 240 | 720            | 226 | 500            | 220            | 75 | 400 | 256 | 276                    |
| <b>BND3152</b>            | 23152-  | H3152X         | 310              | <b>260</b> | 240 | 900            | 292 | 585            | 250            | 90 | 440 | 256 | 276                    |
| <b>BND2252</b>            | 22252-  | H3152X         | 370              | <b>260</b> | 240 | 960            | 286 | 625            | 290            | 95 | 480 | 260 | 280                    |
| <b>BND3252</b>            | 23252-  | H2352X         | 380              | <b>260</b> | 240 | 960            | 330 | 625            | 290            | 95 | 480 | 260 | 280                    |

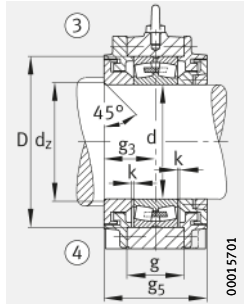
<sup>1)</sup> Ordering example:  
 Housing BND3148-Z-Y-BF-S (see also page 930),  
 bearing 23148-B-MB (see bearing tables).

<sup>2)</sup> ① Locating bearing AF  
 ② Non-locating bearing AL  
 ③ Locating bearing BF  
 ④ Non-locating bearing BL

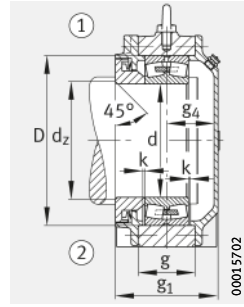




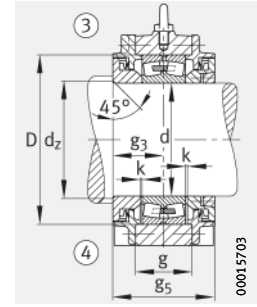
Design A  
Housing with labyrinth seal  
for bearings with cylindrical bore



Design B



Design A  
Housing with Taconite seal  
for bearings with cylindrical bore



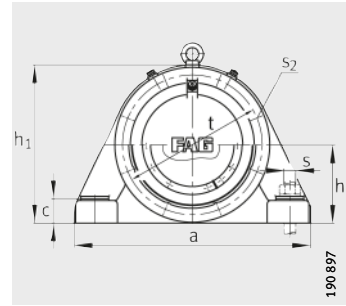
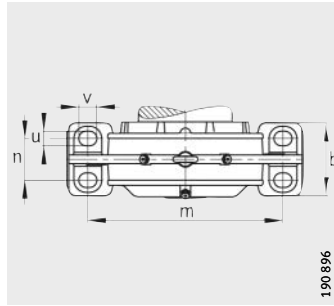
Design B

| g   | g <sub>2</sub> | g <sub>3</sub> | g <sub>4</sub><br>min. | g <sub>5</sub> | h   | k | m   | n   | u  | v  | s   | t   | s <sub>2</sub> |          |
|-----|----------------|----------------|------------------------|----------------|-----|---|-----|-----|----|----|-----|-----|----------------|----------|
|     |                |                |                        |                |     |   |     |     |    |    |     |     |                | Quantity |
| 112 | 248            | 114            | 92                     | 228            | 210 | 3 | 550 | 120 | 36 | 45 | M30 | 370 | M16            | 8        |
| 138 | 274            | 127            | 105                    | 254            | 210 | 3 | 550 | 120 | 36 | 45 | M30 | 370 | M16            | 8        |
| 130 | 266            | 123            | 98                     | 246            | 210 | 3 | 550 | 120 | 36 | 45 | M30 | 370 | M16            | 8        |
| 115 | 258            | 114            | 98                     | 228            | 220 | 3 | 560 | 120 | 42 | 52 | M36 | 380 | M16            | 8        |
| 143 | 286            | 128            | 112                    | 256            | 220 | 3 | 560 | 120 | 42 | 52 | M36 | 380 | M16            | 8        |
| 135 | 278            | 124            | 108                    | 248            | 220 | 3 | 560 | 120 | 42 | 52 | M36 | 380 | M16            | 8        |
| 128 | 269            | 123            | 99                     | 246            | 235 | 4 | 640 | 140 | 42 | 52 | M36 | 420 | M16            | 8        |
| 158 | 299            | 138            | 114                    | 276            | 235 | 4 | 640 | 140 | 42 | 52 | M36 | 420 | M16            | 8        |
| 115 | 241            | 103            | 95                     | 206            | 215 | 3 | 540 | 115 | 42 | 52 | M36 | 375 | M16            | 8        |
| 150 | 291            | 134            | 110                    | 268            | 235 | 4 | 640 | 140 | 42 | 52 | M36 | 420 | M16            | 8        |
| 140 | 314            | 142            | 112                    | 284            | 270 | 4 | 720 | 140 | 42 | 52 | M36 | 455 | M20            | 8        |
| 175 | 329            | 147            | 122                    | 294            | 260 | 4 | 700 | 140 | 42 | 52 | M36 | 445 | M20            | 8        |
| 120 | 251            | 108            | 100                    | 216            | 225 | 4 | 560 | 120 | 42 | 52 | M36 | 400 | M16            | 8        |
| 160 | 334            | 152            | 122                    | 304            | 270 | 4 | 720 | 140 | 42 | 52 | M36 | 455 | M20            | 8        |
| 150 | 311            | 138            | 120                    | 276            | 290 | 4 | 750 | 140 | 42 | 52 | M36 | 510 | M20            | 8        |
| 190 | 351            | 158            | 140                    | 316            | 290 | 4 | 750 | 140 | 42 | 52 | M36 | 510 | M20            | 8        |
| 130 | 261            | 113            | 103                    | 226            | 250 | 4 | 600 | 130 | 42 | 52 | M36 | 440 | M16            | 8        |
| 174 | 335            | 150            | 132                    | 300            | 290 | 4 | 750 | 140 | 42 | 52 | M36 | 510 | M20            | 8        |
| 161 | 326            | 148            | 126                    | 296            | 310 | 3 | 800 | 160 | 42 | 52 | M36 | 535 | M20            | 8        |
| 205 | 370            | 170            | 148                    | 340            | 310 | 3 | 800 | 160 | 42 | 52 | M36 | 535 | M20            | 8        |



# Plummer block housings

BND, unsplit  
 For spherical roller bearings with cylindrical bore, with tapered bore and adapter sleeve



Cross-sections of bearings with cylindrical bore see page 983

①, ②, ③, ④<sup>2)</sup>

**Dimension table** (continued) · Dimensions in mm

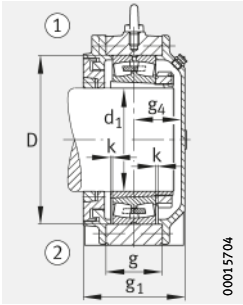
| Designation <sup>1)</sup> |         |                | Mass<br>m<br>≈kg | Dimensions |     |                |     |                |                |     |     |     |                        |
|---------------------------|---------|----------------|------------------|------------|-----|----------------|-----|----------------|----------------|-----|-----|-----|------------------------|
| Housing                   | Bearing | Adapter sleeve |                  | Housing    | d   | d <sub>1</sub> | a   | g <sub>1</sub> | h <sub>1</sub> | b   | c   | D   | d <sub>c</sub><br>min. |
| <b>BND3056</b>            | 23056-  | H3056          | 180              | <b>280</b> | 260 | 760            | 236 | 520            | 240            | 80  | 420 | 276 | 296                    |
| <b>BND3156</b>            | 23156-  | H3156X         | 335              | <b>280</b> | 260 | 900            | 294 | 585            | 250            | 90  | 460 | 280 | 300                    |
| <b>BND2256</b>            | 22256-  | H3156X         | 420              | <b>280</b> | 260 | 1 000          | 297 | 645            | 300            | 100 | 500 | 280 | 300                    |
| <b>BND3256</b>            | 23256-  | H2356X         | 490              | <b>280</b> | 260 | 1 000          | 343 | 645            | 300            | 100 | 500 | 280 | 300                    |
| <b>BND3060</b>            | 23060-  | H3060          | 220              | <b>300</b> | 280 | 820            | 261 | 570            | 250            | 85  | 460 | 296 | 316                    |
| <b>BND3160</b>            | 23160-  | H3160          | 400              | <b>300</b> | 280 | 1 000          | 327 | 645            | 300            | 100 | 500 | 300 | 320                    |
| <b>BND2260</b>            | 22260-  | H3160          | 485              | <b>300</b> | 280 | 1 100          | 317 | 695            | 330            | 105 | 540 | 300 | 320                    |
| <b>BND3260</b>            | 23260-  | H3260          | 570              | <b>300</b> | 280 | 1 100          | 369 | 705            | 330            | 105 | 540 | 300 | 320                    |
| <b>BND3064</b>            | 23064-  | H3064          | 250              | <b>320</b> | 300 | 860            | 266 | 590            | 260            | 90  | 480 | 316 | 336                    |
| <b>BND3164</b>            | 23164-  | H3164          | 500              | <b>320</b> | 300 | 1 150          | 359 | 700            | 300            | 100 | 540 | 320 | 340                    |
| <b>BND2264</b>            | 22264-  | H3164          | 600              | <b>320</b> | 300 | 1 150          | 333 | 745            | 360            | 115 | 580 | 320 | 340                    |
| <b>BND3264</b>            | 23264-  | H3264          | 665              | <b>320</b> | 300 | 1 150          | 391 | 745            | 360            | 115 | 580 | 320 | 340                    |
| <b>BND3068</b>            | 23068-  | H3068          | 300              | <b>340</b> | 320 | 900            | 276 | 630            | 270            | 95  | 520 | 340 | 360                    |
| <b>BND3168</b>            | 23168-  | H3168          | 520              | <b>340</b> | 320 | 1 150          | 373 | 745            | 360            | 115 | 580 | 340 | 360                    |
| <b>BND2268</b>            | 22268-  | H3168          | 635              | <b>340</b> | 320 | 1 200          | 375 | 790            | 380            | 125 | 620 | 344 | 364                    |
| <b>BND3268</b>            | 23268-  | H3268          | 755              | <b>340</b> | 320 | 1 200          | 434 | 790            | 380            | 125 | 620 | 344 | 364                    |

<sup>1)</sup> Ordering example:

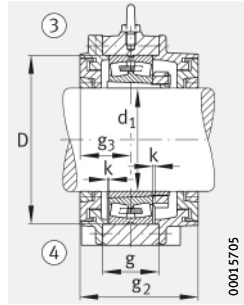
Housing BND3260-H-W-T-AL-S (see also page 932), bearing 23260-K-MB (see bearing tables), adapter sleeve H3260-HG (see dimension tables).

<sup>2)</sup>

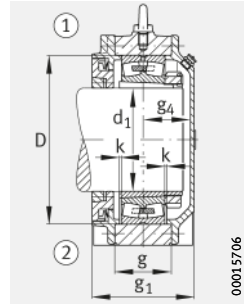
- ① Locating bearing AF
- ② Non-locating bearing AL
- ③ Locating bearing BF
- ④ Non-locating bearing BL



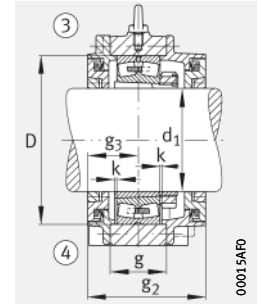
Design A  
Housing with labyrinth seal  
for bearings with tapered bore



Design B



Design A  
Housing with Taconite seal  
for bearings with tapered bore



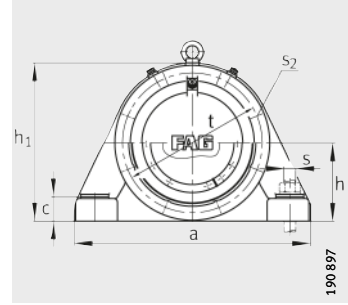
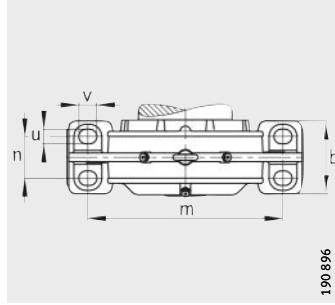
Design B

| g   | g <sub>2</sub> | g <sub>3</sub> | g <sub>4</sub><br>min. | g <sub>5</sub> | h   | k | m   | n   | u  | v  | s   | t   | s <sub>2</sub> |          |
|-----|----------------|----------------|------------------------|----------------|-----|---|-----|-----|----|----|-----|-----|----------------|----------|
|     |                |                |                        |                |     |   |     |     |    |    |     |     |                | Quantity |
| 135 | 281            | 118            | 108                    | 236            | 260 | 4 | 630 | 140 | 42 | 52 | M36 | 460 | M16            | 8        |
| 176 | 337            | 151            | 133                    | 302            | 290 | 4 | 750 | 140 | 42 | 52 | M36 | 510 | M20            | 8        |
| 160 | 354            | 157            | 128                    | 314            | 320 | 4 | 840 | 170 | 42 | 52 | M36 | 555 | M24            | 8        |
| 206 | 400            | 180            | 151                    | 360            | 320 | 4 | 840 | 170 | 42 | 52 | M36 | 555 | M24            | 8        |
| 140 | 296            | 128            | 121                    | 256            | 285 | 4 | 690 | 150 | 42 | 52 | M36 | 510 | M16            | 8        |
| 190 | 384            | 172            | 143                    | 344            | 320 | 4 | 840 | 170 | 42 | 52 | M36 | 555 | M24            | 8        |
| 178 | 352            | 156            | 149                    | 312            | 350 | 4 | 920 | 180 | 56 | 75 | M48 | 600 | M24            | 8        |
| 230 | 404            | 182            | 175                    | 364            | 350 | 4 | 920 | 180 | 56 | 75 | M48 | 600 | M24            | 8        |
| 150 | 311            | 133            | 123                    | 266            | 295 | 4 | 730 | 160 | 42 | 52 | M36 | 530 | M16            | 8        |
| 210 | 412            | 186            | 161                    | 372            | 350 | 4 | 940 | 160 | 42 | 52 | M36 | 590 | M24            | 8        |
| 180 | 381            | 163            | 158                    | 326            | 370 | 5 | 960 | 200 | 56 | 75 | M48 | 640 | M24            | 8        |
| 238 | 439            | 192            | 187                    | 384            | 370 | 5 | 960 | 200 | 56 | 75 | M48 | 640 | M24            | 8        |
| 160 | 311            | 133            | 132                    | 266            | 315 | 5 | 770 | 170 | 42 | 52 | M36 | 565 | M20            | 8        |
| 220 | 421            | 183            | 178                    | 366            | 370 | 5 | 960 | 200 | 56 | 75 | M48 | 640 | M24            | 8        |
| 201 | 430            | 187,5          | 176                    | 375            | 390 | 5 | 990 | 200 | 64 | 85 | M56 | 680 | M30            | 8        |
| 260 | 489            | 217            | 205                    | 434            | 390 | 5 | 990 | 200 | 64 | 85 | M56 | 680 | M30            | 8        |



# Plummer block housings

BND, unsplit  
 For spherical roller bearings with cylindrical bore, with tapered bore and adapter sleeve



Cross-sections of bearings with cylindrical bore see page 983

①, ②, ③, ④<sup>2)</sup>

**Dimension table** (continued) · Dimensions in mm

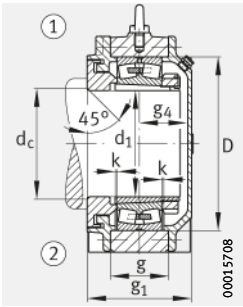
| Designation <sup>1)</sup> |         |                | Mass<br>m<br>≈kg | Dimensions |     |                |     |                |                |     |     |     |                        |
|---------------------------|---------|----------------|------------------|------------|-----|----------------|-----|----------------|----------------|-----|-----|-----|------------------------|
| Housing                   | Bearing | Adapter sleeve |                  | Housing    | d   | d <sub>1</sub> | a   | g <sub>1</sub> | h <sub>1</sub> | b   | c   | D   | d <sub>c</sub><br>min. |
| <b>BND3072</b>            | 23072-  | H3072          | 330              | <b>360</b> | 340 | 960            | 290 | 660            | 280            | 100 | 540 | 360 | 380                    |
| <b>BND3172</b>            | 23172-  | H3172          | 600              | <b>360</b> | 340 | 1 200          | 400 | 760            | 370            | 115 | 600 | 360 | 380                    |
| <b>BND2272</b>            | 22272-  | H3172          | 690              | <b>360</b> | 340 | 1 280          | 375 | 820            | 400            | 130 | 650 | 364 | 384                    |
| <b>BND3272</b>            | 23272-  | H3272          | 950              | <b>360</b> | 340 | 1 280          | 437 | 820            | 400            | 130 | 650 | 364 | 384                    |
| <b>BND3076</b>            | 23076-  | H3076          | 360              | <b>380</b> | 360 | 1 000          | 294 | 680            | 300            | 105 | 560 | 380 | 400                    |
| <b>BND3176</b>            | 23176-  | H3176          | 720              | <b>380</b> | 360 | 1 200          | 404 | 790            | 380            | 125 | 620 | 380 | 400                    |
| <b>BND2276</b>            | 22276-  | H3176          | 900              | <b>380</b> | 360 | 1 350          | 433 | 865            | 405            | 135 | 680 | 384 | 404                    |
| <b>BND3276</b>            | 23276-  | H3276          | 1 100            | <b>380</b> | 360 | 1 350          | 489 | 860            | 405            | 135 | 680 | 384 | 404                    |
| <b>BND3080</b>            | 23080-  | H3080          | 400              | <b>400</b> | 380 | 1 060          | 310 | 720            | 320            | 110 | 600 | 400 | 420                    |
| <b>BND3180</b>            | 23180-  | H3180          | 750              | <b>400</b> | 380 | 1 280          | 405 | 820            | 400            | 130 | 650 | 404 | 424                    |
| <b>BND2280</b>            | 22280-  | H3180          | 940              | <b>400</b> | 380 | 1 430          | 433 | 900            | 450            | 145 | 720 | 404 | 424                    |
| <b>BND3280</b>            | 23280-  | H3280          | 1 205            | <b>400</b> | 380 | 1 430          | 504 | 900            | 450            | 145 | 720 | 404 | 424                    |
| <b>BND3084</b>            | 23084-  | H3084          | 435              | <b>420</b> | 400 | 1 100          | 310 | 755            | 340            | 115 | 620 | 420 | 440                    |
| <b>BND3184</b>            | 23184-  | H3184          | 950              | <b>420</b> | 400 | 1 350          | 440 | 900            | 420            | 135 | 700 | 424 | 444                    |
| <b>BND2284</b>            | 22284-  | H3184          | 1 055            | <b>420</b> | 400 | 1 500          | 433 | 950            | 470            | 150 | 760 | 430 | 450                    |
| <b>BND3284</b>            | 23284-  | H3284          | 1 310            | <b>420</b> | 400 | 1 500          | 510 | 950            | 470            | 150 | 760 | 430 | 450                    |

<sup>1)</sup> Ordering example:

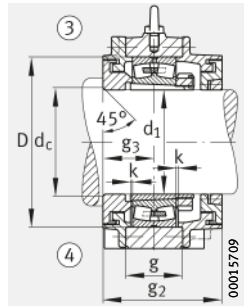
Housing BND3084-H-C-T-BF-S (see also page 933), bearing 23084-B-K-MB (see bearing tables), adapter sleeve H3084X-HG (see dimension tables).

<sup>2)</sup>

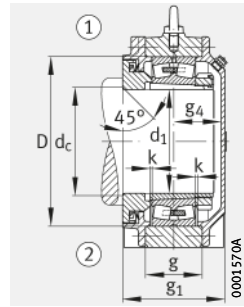
- ① Locating bearing AF
- ② Non-locating bearing AL
- ③ Locating bearing BF
- ④ Non-locating bearing BL



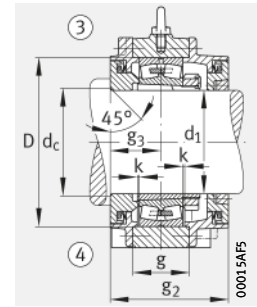
Design A  
Housing with labyrinth seal for bearings  
with tapered bore, shaft with abutment shoulder



Design B  
Housing with Taconite seal for bearings  
with tapered bore, shaft with abutment shoulder



Design A  
Housing with Taconite seal for bearings  
with tapered bore, shaft with abutment shoulder



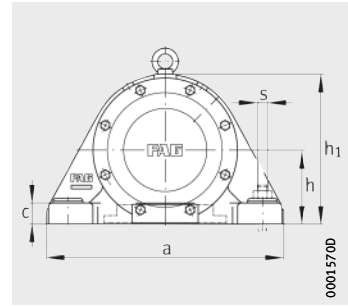
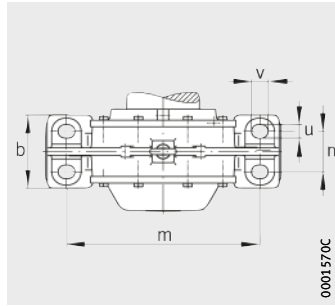
Design B  
Housing with Taconite seal for bearings  
with tapered bore, shaft with abutment shoulder

| g   | g <sub>2</sub> | g <sub>3</sub> | g <sub>4</sub><br>min. | g <sub>5</sub> | h   | k | m    | n   | u  | v  | s   | t   | s <sub>2</sub> |          |
|-----|----------------|----------------|------------------------|----------------|-----|---|------|-----|----|----|-----|-----|----------------|----------|
|     |                |                |                        |                |     |   |      |     |    |    |     |     |                | Quantity |
| 170 | 325            | 140            | 138                    | 280            | 330 | 5 | 820  | 180 | 42 | 52 | M36 | 590 | M20            | 8        |
| 225 | 450            | 200            | 188                    | 400            | 380 | 4 | 1000 | 200 | 56 | 75 | M48 | 650 | M24            | 8        |
| 205 | 435            | 185            | 178                    | 370            | 410 | 5 | 1040 | 210 | 72 | 90 | M64 | 710 | M30            | 8        |
| 267 | 497            | 216            | 209                    | 432            | 410 | 5 | 1040 | 210 | 72 | 90 | M64 | 710 | M30            | 8        |
| 160 | 329            | 142            | 141                    | 284            | 340 | 7 | 840  | 190 | 56 | 75 | M48 | 610 | M20            | 8        |
| 230 | 459            | 202            | 190                    | 404            | 390 | 5 | 1000 | 200 | 64 | 85 | M56 | 680 | M30            | 8        |
| 230 | 470            | 203            | 218                    | 406            | 425 | 5 | 1100 | 225 | 72 | 90 | M64 | 745 | M30            | 8        |
| 295 | 529            | 232            | 244                    | 464            | 425 | 5 | 1100 | 225 | 72 | 90 | M64 | 745 | M30            | 8        |
| 175 | 355            | 150            | 145                    | 300            | 360 | 7 | 900  | 200 | 56 | 75 | M48 | 650 | M20            | 8        |
| 235 | 465            | 200            | 193                    | 400            | 410 | 5 | 1040 | 210 | 72 | 90 | M64 | 710 | M30            | 8        |
| 229 | 498            | 216,5          | 202                    | 433            | 450 | 5 | 1160 | 240 | 72 | 90 | M64 | 790 | M30            | 8        |
| 300 | 569            | 252            | 237                    | 504            | 450 | 5 | 1160 | 240 | 72 | 90 | M64 | 790 | M30            | 8        |
| 180 | 350            | 150            | 149                    | 300            | 375 | 7 | 940  | 210 | 56 | 75 | M48 | 670 | M20            | 8        |
| 260 | 510            | 210            | 215                    | 420            | 450 | 7 | 1100 | 210 | 64 | 85 | M56 | 760 | M30            | 8        |
| 238 | 498            | 216,5          | 202                    | 433            | 470 | 5 | 1220 | 255 | 72 | 90 | M64 | 835 | M30            | 8        |
| 315 | 575            | 255            | 240                    | 510            | 470 | 5 | 1220 | 255 | 72 | 90 | M64 | 835 | M30            | 8        |



# Plummer block housings

BNM, unsplit  
For spherical roller bearings with tapered bore and withdrawal sleeve



**Dimension table** - Dimensions in mm

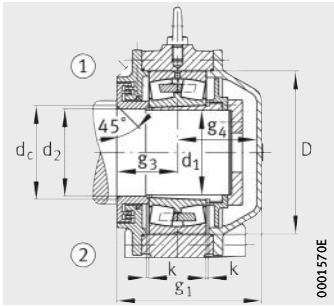
| Designation <sup>1)</sup> |         |                   | Mass<br>m<br>Housing<br>≈kg | Dimensions     |       |                |                |     |     |     |
|---------------------------|---------|-------------------|-----------------------------|----------------|-------|----------------|----------------|-----|-----|-----|
| Housing                   | Bearing | Withdrawal sleeve |                             | d <sub>1</sub> | a     | g <sub>1</sub> | h <sub>1</sub> | b   | c   | D   |
| <b>BNM3236</b>            | 23236-  | AH3236            | 160                         | <b>170</b>     | 680   | 310            | 425            | 210 | 65  | 320 |
| <b>BNM3238</b>            | 23238-  | AH3238            | 180                         | <b>180</b>     | 710   | 325            | 455            | 220 | 85  | 340 |
| <b>BNM3240</b>            | 23240-  | AH3240            | 240                         | <b>190</b>     | 780   | 350            | 475            | 240 | 75  | 360 |
| <b>BNM3244</b>            | 23244-  | AH2344            | 290                         | <b>200</b>     | 850   | 375            | 525            | 250 | 80  | 400 |
| <b>BNM3248</b>            | 23248-  | AH2348            | 330                         | <b>220</b>     | 900   | 360            | 585            | 250 | 90  | 440 |
| <b>BNM3252</b>            | 23252-  | AH2352            | 480                         | <b>240</b>     | 960   | 415            | 625            | 290 | 95  | 480 |
| <b>BNM3256</b>            | 23256-  | AH2356            | 550                         | <b>260</b>     | 1 000 | 435            | 645            | 300 | 100 | 500 |
| <b>BNM3260</b>            | 23260-  | AH3260            | 660                         | <b>280</b>     | 1 100 | 455            | 705            | 330 | 105 | 540 |
| <b>BNM3264</b>            | 23264-  | AH3264            | 800                         | <b>300</b>     | 1 150 | 490            | 745            | 360 | 115 | 580 |
| <b>BNM3268</b>            | 23268-  | AH3268            | 930                         | <b>320</b>     | 1 200 | 515            | 790            | 380 | 125 | 620 |
| <b>BNM3272</b>            | 23272-  | AH3272            | 1 100                       | <b>340</b>     | 1 280 | 545            | 820            | 400 | 130 | 650 |
| <b>BNM3276</b>            | 23276-  | AH3276            | 1 210                       | <b>360</b>     | 1 350 | 570            | 860            | 405 | 135 | 680 |
| <b>BNM3280</b>            | 23280-  | AH3280            | 1 510                       | <b>380</b>     | 1 430 | 605            | 900            | 450 | 145 | 720 |
| <b>BNM3284</b>            | 23284-  | AH3284            | 1 710                       | <b>400</b>     | 1 500 | 615            | 950            | 470 | 150 | 760 |

<sup>1)</sup> Ordering example:

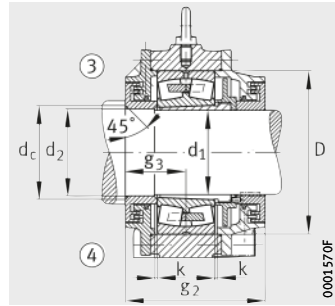
Housing BNM3260-AH-R-AF (see also page 937), bearing 23260-K-MB (see bearing tables), withdrawal sleeve AH3260G-H (see dimension tables).

<sup>2)</sup>

- ① Locating bearing AF
- ② Non-locating bearing AL
- ③ Locating bearing BF
- ④ Non-locating bearing BL



Design A  
①, ②<sup>2)</sup>



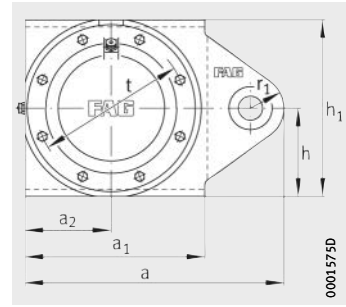
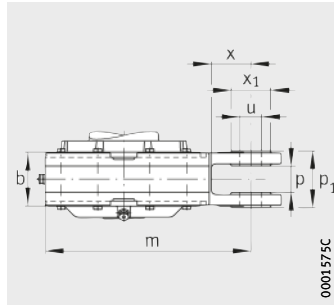
Design B  
③, ④<sup>2)</sup>

| $d_2$ | $d_c$<br>min. | $g_2$ | $g_3$ | $g_4$<br>min. | $h$ | $k$ | $m$  | $n$ | $u$ | $v$ | $s$ |
|-------|---------------|-------|-------|---------------|-----|-----|------|-----|-----|-----|-----|
| 175   | 185           | 310   | 135   | 165           | 210 | 4   | 550  | 120 | 36  | 45  | M30 |
| 185   | 195           | 330   | 145   | 170           | 220 | 4   | 560  | 120 | 42  | 52  | M36 |
| 195   | 205           | 350   | 155   | 185           | 235 | 4   | 640  | 140 | 42  | 52  | M36 |
| 210   | 220           | 385   | 165   | 200           | 260 | 4   | 700  | 140 | 42  | 52  | M36 |
| 230   | 242           | 365   | 155   | 195           | 290 | 4   | 750  | 140 | 42  | 52  | M36 |
| 250   | 262           | 410   | 180   | 220           | 310 | 5   | 800  | 160 | 42  | 52  | M36 |
| 270   | 282           | 440   | 190   | 230           | 320 | 5   | 840  | 170 | 42  | 52  | M36 |
| 290   | 302           | 450   | 200   | 240           | 350 | 5   | 920  | 180 | 56  | 75  | M48 |
| 310   | 326           | 475   | 210   | 265           | 370 | 5   | 960  | 200 | 56  | 75  | M48 |
| 330   | 350           | 505   | 220   | 280           | 390 | 6   | 990  | 200 | 64  | 85  | M56 |
| 350   | 370           | 535   | 235   | 295           | 410 | 6   | 1040 | 210 | 72  | 90  | M64 |
| 370   | 390           | 575   | 255   | 300           | 425 | 6   | 1100 | 225 | 72  | 90  | M64 |
| 390   | 410           | 605   | 270   | 320           | 450 | 6   | 1160 | 240 | 72  | 90  | M64 |
| 410   | 430           | 625   | 280   | 320           | 470 | 7,5 | 1220 | 255 | 72  | 90  | M64 |



# Take-up housings

SPA, unsplit  
For spherical roller bearings  
with tapered bore  
and adapter sleeve



①, ②, ③, ④<sup>2)</sup>

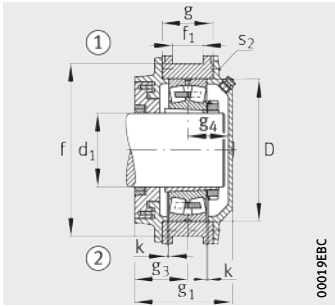
**Dimension table** - Dimensions in mm

| Designation <sup>1)</sup> |         |                | Mass<br>m<br>≈kg | Dimensions     |      |                |                |     |     |                |     |                |                |
|---------------------------|---------|----------------|------------------|----------------|------|----------------|----------------|-----|-----|----------------|-----|----------------|----------------|
| Housing                   | Bearing | Adapter sleeve |                  | d <sub>1</sub> | a    | a <sub>1</sub> | a <sub>2</sub> | D   | f   | f <sub>1</sub> | g   | g <sub>1</sub> | g <sub>2</sub> |
| SPA3236                   | 23236-  | H2336          | 170              | 160            | 600  | 420            | 210            | 320 | 410 | 93             | 138 | 240            | 274            |
| SPA3140                   | 23140-  | H3140          | 165              | 180            | 650  | 420            | 210            | 340 | 410 | 100            | 135 | 242            | 278            |
| SPA3240                   | 23240-  | H2340          | 260              | 180            | 650  | 470            | 235            | 360 | 460 | 103            | 158 | 260            | 299            |
| SPA3044                   | 23044-  | H3044X         | 180              | 200            | 615  | 430            | 210            | 340 | 440 | 65             | 115 | 206            | 241            |
| SPA3144                   | 23144-  | H3144X         | 280              | 200            | 885  | 470            | 235            | 370 | 480 | 105            | 150 | 252            | 291            |
| SPA3244                   | 23244-  | H2344X         | 325              | 200            | 940  | 520            | 260            | 400 | 500 | 90             | 175 | 279            | 329            |
| SPA3148                   | 23148-  | H3148X         | 330              | 220            | 925  | 520            | 260            | 400 | 500 | 65             | 160 | 284            | 334            |
| SPA3248                   | 23248-  | H2348X         | 430              | 220            | 970  | 560            | 280            | 440 | 545 | 95             | 190 | 308            | 351            |
| SPA3052                   | 23052-  | H3052X         | 225              | 240            | 910  | 500            | 245            | 400 | 500 | 65             | 130 | 226            | 261            |
| SPA3152                   | 23152-  | H3152X         | 325              | 240            | 990  | 550            | 275            | 440 | 540 | 80             | 174 | 292            | 335            |
| SPA3252                   | 23252-  | H2352X         | 410              | 240            | 1063 | 596            | 298            | 480 | 570 | 103            | 205 | 330            | 370            |
| SPA3056                   | 23056-  | H3056          | 310              | 260            | 910  | 500            | 245            | 420 | 500 | 65             | 135 | 236            | 281            |
| SPA3256                   | 23256-  | H2356X         | 520              | 260            | 1095 | 630            | 315            | 500 | 610 | 123            | 206 | 343            | 400            |
| SPA3160                   | 23160-  | H3160          | 440              | 280            | 1115 | 630            | 315            | 500 | 610 | 130            | 190 | 327            | 384            |
| SPA3260                   | 23260-  | H3260          | 620              | 280            | 1200 | 680            | 340            | 540 | 650 | 115            | 230 | 369            | 404            |
| SPA3164                   | 23164-  | H3164          | 560              | 300            | 1140 | 665            | 340            | 540 | 630 | 123            | 210 | 359            | 412            |
| SPA3264                   | 23264-  | H3264          | 810              | 300            | 1280 | 710            | 355            | 580 | 670 | 123            | 238 | 391            | 439            |
| SPA3168                   | 23168-  | H3168          | 630              | 320            | 1290 | 740            | 370            | 580 | 700 | 150            | 220 | 373            | 421            |
| SPA3268                   | 23268-  | H3268          | 920              | 320            | 1335 | 735            | 385            | 620 | 700 | 123            | 260 | 434            | 489            |
| SPA3272                   | 23272-  | H3272          | 885              | 340            | 1390 | 800            | 400            | 650 | 790 | 123            | 267 | 437            | 497            |
| SPA3176                   | 23176-  | H3176          | 700              | 360            | 1325 | 750            | 375            | 620 | 740 | 120            | 230 | 404            | 459            |
| SPA3276                   | 23276-  | H3276          | 900              | 360            | 1385 | 810            | 405            | 680 | 780 | 123            | 295 | 489            | 529            |
| SPA3280                   | 23280-  | H3280          | 1600             | 380            | 1460 | 880            | 440            | 720 | 900 | 190            | 300 | 504            | 569            |
| SPA3284                   | 23284-  | H3284          | 1800             | 400            | 1488 | 925            | 465            | 760 | 900 | 190            | 315 | 510            | 575            |

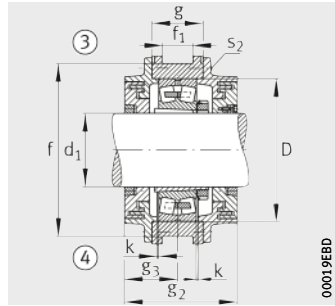
1) Ordering example:  
Housing SPA3260-H-W-Y-BF-S (see also page 939),  
bearing 23260-K-MB (see bearing tables), adapter sleeve H3260-HG (see dimension tables).

2) ① Locating bearing AF  
② Non-locating bearing AL  
③ Locating bearing BF  
④ Non-locating bearing BL





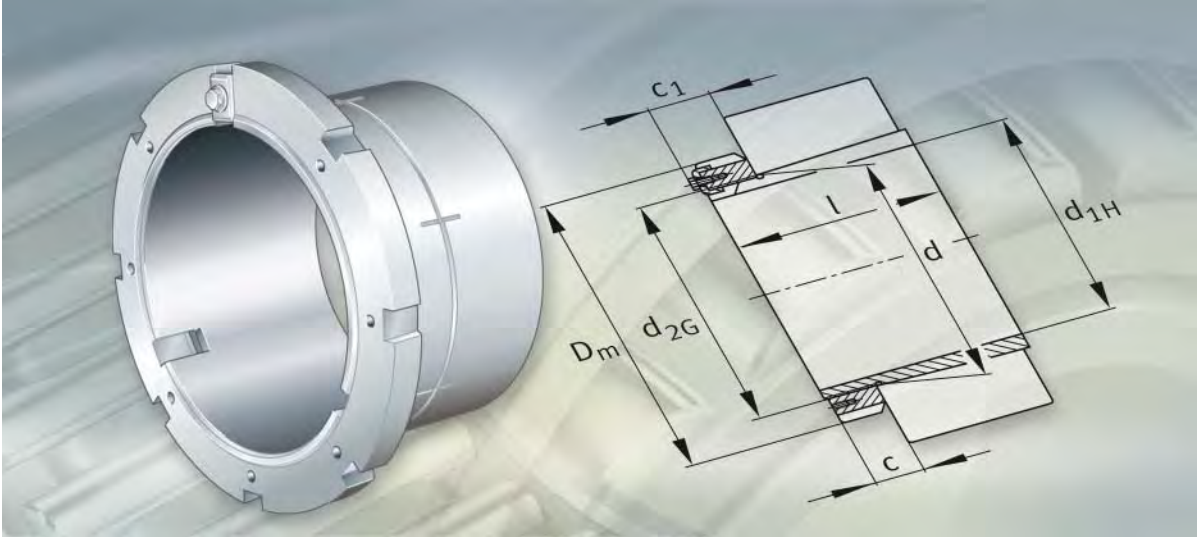
Guidance on both sides  
Design A



Guidance on both sides  
Design B

| g <sub>3</sub> | g <sub>4</sub> | h <sub>1</sub> | k | m   | p   | p <sub>1</sub> | r <sub>1</sub> | t   | s <sub>2</sub> |          | u   | x   | x <sub>1</sub> |
|----------------|----------------|----------------|---|-----|-----|----------------|----------------|-----|----------------|----------|-----|-----|----------------|
|                |                |                |   |     |     |                |                |     |                | Quantity |     |     |                |
| 127            | 105            | 450            | 3 | 300 | 72  | 140            | 90             | 370 | M16            | 8        | 80  | 90  | 120            |
| 124            | 108            | 440            | 3 | 360 | 70  | 140            | 80             | 380 | M16            | 8        | 60  | 140 | 100            |
| 138            | 114            | 500            | 4 | 325 | 72  | 140            | 90             | 420 | M16            | 8        | 80  | 85  | 120            |
| 103            | 95             | 480            | 3 | 325 | 70  | 200            | 80             | 375 | M16            | 8        | 60  | 100 | 100            |
| 134            | 110            | 510            | 4 | 530 | 74  | 144            | 120            | 420 | M16            | 8        | 100 | 260 | 140            |
| 147            | 122            | 540            | 4 | 530 | 130 | 200            | 150            | 445 | M20            | 8        | 100 | 250 | 140            |
| 152            | 122            | 540            | 4 | 515 | 123 | 215            | 150            | 455 | M20            | 8        | 100 | 250 | 140            |
| 158            | 140            | 580            | 4 | 540 | 130 | 220            | 150            | 510 | M20            | 8        | 100 | 260 | 140            |
| 113            | 103            | 540            | 4 | 515 | 123 | 215            | 150            | 440 | M16            | 8        | 100 | 250 | 140            |
| 150            | 132            | 570            | 4 | 565 | 135 | 225            | 150            | 510 | M20            | 8        | 100 | 270 | 140            |
| 170            | 148            | 610            | 3 | 615 | 173 | 240            | 150            | 535 | M20            | 8        | 100 | 300 | 140            |
| 118            | 108            | 540            | 4 | 515 | 123 | 215            | 150            | 460 | M16            | 8        | 100 | 250 | 140            |
| 180            | 151            | 650            | 4 | 630 | 173 | 240            | 150            | 555 | M24            | 8        | 100 | 220 | 140            |
| 172            | 143            | 650            | 4 | 650 | 170 | 270            | 150            | 555 | M24            | 8        | 100 | 310 | 140            |
| 182            | 175            | 690            | 4 | 680 | 190 | 270            | 180            | 600 | M24            | 8        | 100 | 310 | 140            |
| 186            | 161            | 670            | 4 | 650 | 170 | 240            | 150            | 590 | M24            | 8        | 100 | 310 | 175            |
| 192            | 187            | 710            | 5 | 725 | 213 | 300            | 200            | 640 | M24            | 8        | 110 | 275 | 170            |
| 183            | 178            | 740            | 5 | 720 | 180 | 300            | 200            | 640 | M24            | 8        | 120 | 310 | 180            |
| 217            | 205            | 740            | 5 | 750 | 213 | 300            | 200            | 680 | M30            | 8        | 110 | 310 | 170            |
| 216            | 209            | 830            | 5 | 765 | 213 | 330            | 225            | 710 | M30            | 8        | 130 | 310 | 190            |
| 202            | 190            | 790            | 5 | 750 | 200 | 300            | 200            | 680 | M30            | 8        | 110 | 320 | 170            |
| 232            | 244            | 820            | 5 | 780 | 213 | 300            | 200            | 745 | M30            | 8        | 110 | 305 | 170            |
| 252            | 237            | 960            | 5 | 820 | 180 | 300            | 200            | 790 | M30            | 8        | 110 | 350 | 170            |
| 255            | 240            | 960            | 5 | 825 | 180 | 300            | 200            | 835 | M30            | 8        | 110 | 350 | 170            |





## Fasteners and retainers

- Adapter sleeves
- Withdrawal sleeves
- Locknuts
- Shaft nuts
- Tab washers
- Retaining brackets
- Hydraulic nuts

# Fasteners and retainers

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|                                     | Hydraulic nuts                       |
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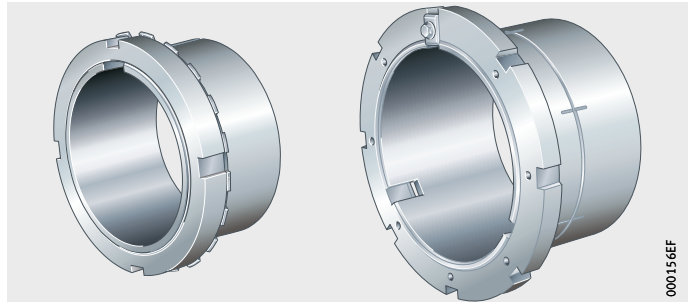


# Product overview Fasteners and retainers

## Adapter sleeves

With nut and tab washer,  
taper 1:12 or 1:30

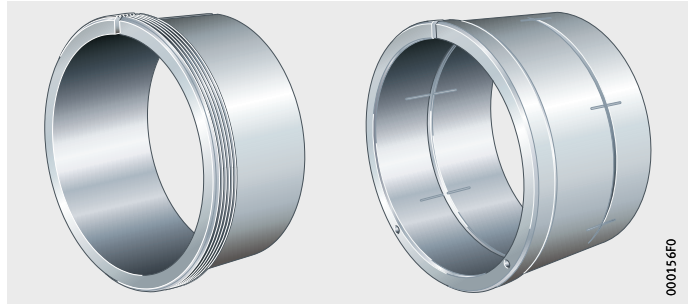
H23, H30, H31, H32, H33, H39, H240, H241



## Withdrawal sleeves

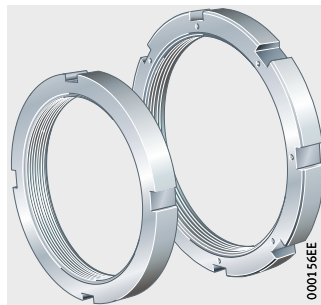
Taper 1:12 or 1:30

AH22, AH(X)23, AH(X)30, AH(X)31, AH(X)32, AH33, AH38, AH39,  
AH240, AH241



## Locknuts Shaft nuts

KM, KML, HM, HM30, HM31

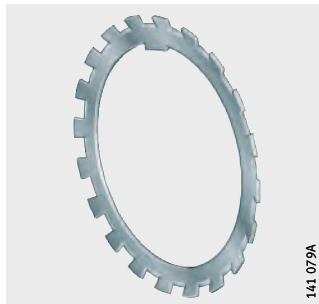


HMZ, HMZ30



**Tab washers**  
**Retaining brackets with screw**

MB, MBL

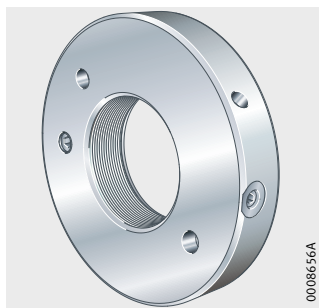


MS30, MS31

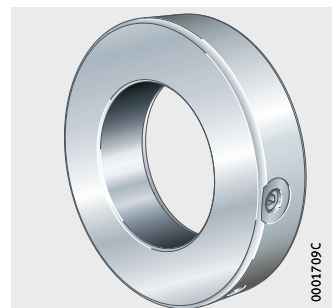


**Hydraulic nuts**  
With thread  
Increased capacity design  
with smooth bore

HYDNUT, HYDNUT..-INCH



HYDNUT..-HEAVY



# Fasteners and retainers

## Features

The location of bearings with a tapered bore on cylindrical shaft studs can be carried out using easy-to-fit, reliable adapter and withdrawal sleeves.

Locknuts or shaft nuts can be used to locate bearings on shafts or adapter sleeves. Gradual loosening of nuts can be prevented using tab washers or retaining brackets.

Shaft nuts are secured by means of force locking.

## Adapter sleeves

### For smooth and stepped shafts

Adapter sleeves are suitable where bearings with a tapered bore are to be located on cylindrical shafts. They do not need to be secured on the shaft by any additional means.

The bearings can be positioned at any point on smooth shafts.

If adapter sleeves are used with a support ring on stepped shafts, the bearings can be axially located to high accuracy.

In addition, this gives simpler dismantling of the bearings.

Adapter sleeves comprise slotted adapter sleeves, locknuts and tab washers. For larger sizes, retaining brackets are used instead of tab washers.

The tensile strength of the material is at least  $430 \text{ N/mm}^2$ .

The outside surface of the sleeves has a taper 1:12 while series H240 and H241 have a taper 1:30.

The dimension tables contain adapter sleeves for metric shafts. Sleeves for inch size shafts are available by agreement.

### For hydraulic method

Mounting and dismantling of large bearings requires high mounting forces and is made easier by using the hydraulic method.

There are adapter sleeves with oil slots on the tapered outside surface and a pump connector on the thread side.

These adapter sleeves have the suffix HG.

The dimension tables describe the threads for the pump connector.

**Withdrawal sleeves** Withdrawal sleeves are suitable where bearings with a tapered bore are to be located on cylindrical shafts. The tapered sleeve is pressed into the bearing bore until the required reduction in radial internal clearance is achieved. The bearing is abutted, for example, against a shoulder on the shaft. Retainers are not included in the delivery. The tensile strength of the material is at least 430 N/mm<sup>2</sup>. The outside surface of the slotted steel sleeves has a taper 1:12, while series AH240 and AH241 have a taper 1:30.

**For hydraulic method** Mounting and dismounting of large bearings requires high mounting forces and is made easier by using the hydraulic method. There are withdrawal sleeves with oil slots on the tapered outside surface and two pump connectors offset to each other by 90°. These withdrawal sleeves have the suffix H. The dimension tables give the mounting dimensions for the pump connector.

**Locknuts** Locknuts can be used to locate bearings on shafts or adapter sleeves. They also give easier mounting of bearings with a tapered shaft seat and the mounting and dismounting of bearings on withdrawal sleeves. The locknuts are made from steel and the tensile strength of the material is at least 350 N/mm<sup>2</sup>. They have four or eight evenly spaced slots on the circumference, into which hook wrenches or striking-face wrenches can be fitted. By agreement, locknuts of series HM30..-H, HM31..-H with threaded holes for mounting screws are available.



## Fasteners and retainers

### Shaft nuts

Shaft nuts HMZ allow precise, secure axial location of bearings on cylindrical and tapered shafts or on adapter sleeves.

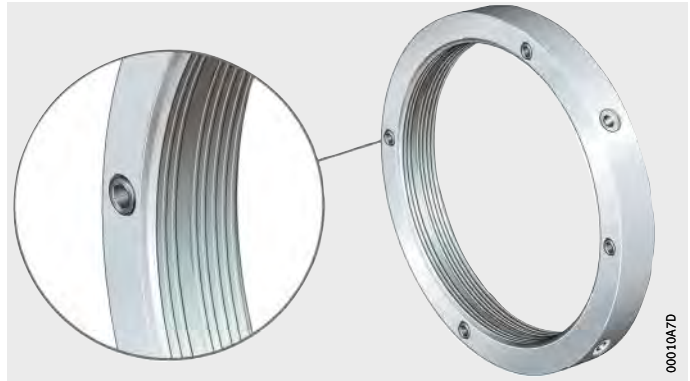
The shaft nuts are made from steel and the tensile strength is at least  $350 \text{ N/mm}^2$ .

Shaft nuts HMZ are interchangeable with conventional locknuts HM and KM. They are secured, however, not by means of washers or brackets but by force locking. Four or eight axial clamping screws allow uniform clamping around the circumference, *Figure 1*.

For screw mounting on the shaft thread, the circumference of the nut has four or eight threaded blind holes into which the threaded rod also supplied is screwed. There is no need either for slots on the outside diameter of the nut or for any retainers.

Since the shaft does not have a retaining slot, it has higher strength and is more economical to manufacture.

Shaft nuts HMZ are described in TPI WL 91-8, HMZ Shaft Nuts.



*Figure 1*  
Clamping screws for generating  
a force locking connection between  
the nut and shaft thread



**Tab washers**

Tab washers MB and MBL are simple, reliable elements for securing smaller locknuts (nuts of series KM and KML).

They have an inner tab and several outer tabs evenly spaced around the circumference. The inner tab grips in the slot on the adapter sleeve or shaft, while one of the outer tabs is bent into a slot in the nut for location.

The washers are made from steel and the tensile strength is at least 300 N/mm<sup>2</sup>.

**Retaining brackets**

Retaining brackets of series MS are fixed to the locknut using a hexagonal screw. They engage in a slot in the nut and in the adapter sleeve or shaft.

The fixing screw has a self-locking thread up to M16, for sizes from M20 a standardised hexagonal screw with a retainer is used.

Retaining brackets are used with locknuts of series HM30 and HM31.



# Fasteners and retainers

## Hydraulic nuts

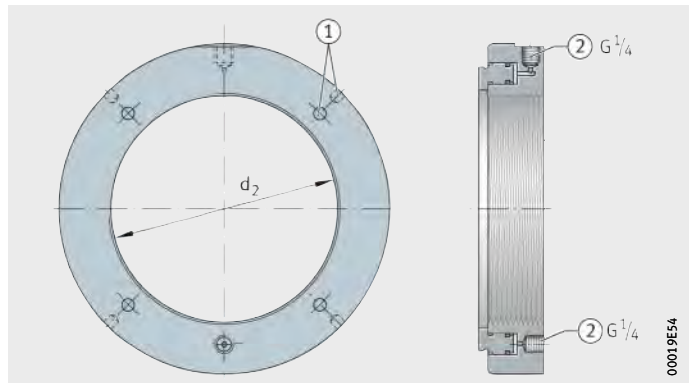
FAG hydraulic nuts HYDNUT are used to press parts with a tapered bore onto their tapered seat. Presses are mainly used if the drive-up forces required cannot be applied using other accessories, such as shaft nuts or pressure screws.

A main area of application is the mounting of rolling bearings with a tapered bore. The bearings can be seated directly on a tapered shaft, on an adapter sleeve or a withdrawal sleeve. If the bearing is located using a withdrawal sleeve or an adapter sleeve, the hydraulic nut can also be used for dismantling.

The hydraulic nuts HYDNUT comprise a press ring and an annular piston. The piston is operated by hydraulic means. The pressure chamber is sealed by two soft PVC sealing cords mounted on rings, *Figure 2*.

- ① Handling holes
- ② Oil connector

*Figure 2*  
Hydraulic nuts with thread



The hydraulic nuts are designed for an oil pressure of max. 800 bar. The stroke is dimensioned such that the parts with a tapered bore can be mounted in a single operation.

### Hydraulic nuts with thread

For all standardised adapter and withdrawal sleeves of metric sizes, we supply hydraulic nuts in which the bore of the press ring  $d_2$  has a metric precision thread or a trapezoidal thread. Designs with an inch size thread (suffix INCH) are also available. All hydraulic nuts with a thread have holes to make handling easier. FAG hydraulic nuts with a thread have two oil connectors G1/4 on the end face and one on the outside surface. The second connector on the end face allows the use of a displacement gauge.

### Hydraulic nuts of increased capacity design with smooth bore

Hydraulic nuts of increased capacity design for high drive-up forces, developed principally for shipbuilding, have a smooth bore. The design is indicated by the suffix HEAVY.

We supply a comprehensive, matched range of accessories including pressure generators and connectors, see also TPI WL 195, FAG Pressure Generation Devices.

Selection of suitable products is assisted by the computer program MOUNTING MANAGER.

Hydraulic nuts HYDNUT are described in detail in TPI WL 196, FAG Hydraulic Nuts.

### Suffixes

Suffixes for available designs: see table.

### Available designs

| Suffix | Description                                | Design   |
|--------|--|----------|
| H      | Hydraulic withdrawal sleeve                | Standard |
| HG     | Hydraulic adapter sleeve                   |          |
| HEAVY  | Hydraulic nut of increased capacity design |          |
| INCH   | Hydraulic nut with inch size thread        |          |



# Fasteners and retainers

## Design and safety guidelines Shaft tolerances

Adapter and withdrawal sleeves adapt themselves to the shaft. Larger diameter tolerances are therefore permissible for shafts than in the case of a direct cylindrical seat for a bearing on the shaft.

For general applications, bearing seats toleranced to h9 are sufficient.

The geometrical tolerances must be tighter than the diameter tolerances since the geometrical accuracy affects the running accuracy of the bearing arrangement. The cylindricity tolerance of the bearing seat should be within IT5/2 or IT6/2.

## **Accuracy**

### **Adapter sleeves**

The dimensions and material conform to DIN 5 415/ISO 2 982-1.  
The bore tolerance of adapter sleeves before slitting for a taper 1:12 lies in tolerance zone JS9 and for a taper 1:30 in zone JS7.  
Up to M200, the thread is a metric precision thread to tolerance grade 6g to DIN/ISO 965-3, over M200 trapezoidal threads are used.

### **Withdrawal sleeves**

The dimensions and material conform to DIN 5 416/ISO 2 982-1.  
The bore tolerance of adapter sleeves before slitting for a taper 1:12 lies in tolerance zone JS9 and for a taper 1:30 in zone JS7.  
Up to M200, the thread is a metric precision thread to tolerance grade 6g to DIN/ISO 965-3, over M200 trapezoidal threads are used.  
Designs with a modified thread  $d_{2G}$  have the suffix G.

### **Locknuts and shaft nuts**

The dimensions and material conform to DIN 981/ISO 2 982-2.  
Deviations are indicated in the dimension tables.  
Up to a thread diameter 200 mm, the thread is a metric precision thread, larger locknuts and shaft nuts have trapezoidal threads.

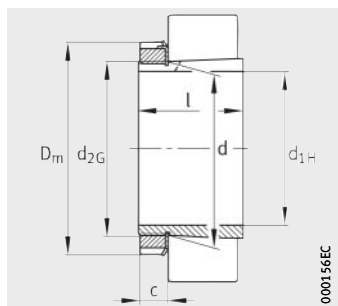
### **Hydraulic nuts**

FAG hydraulic nuts with a metric thread are available to fit all standardised adapter and withdrawal sleeves of metric sizes.  
Up to M200, the thread is a metric precision thread to DIN 13, over M200 trapezoidal threads to DIN 103 are used.  
Inch size threads conform to the ABMA Standards for Bearing Mounting Accessories, Section 8, Locknuts Series N-00.

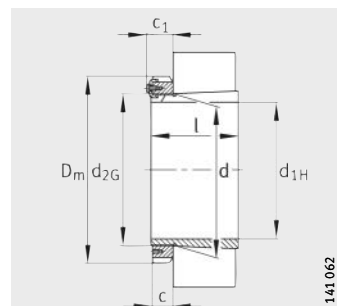


# Adapter sleeves

With nut and retainer



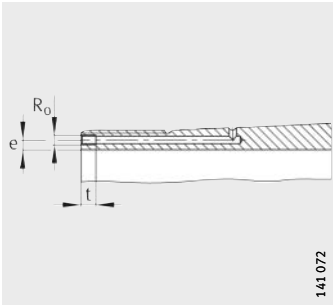
Taper 1:12  
(taper 1:30 for H241)  
Tab washer MB



Taper 1:12  
(taper 1:30 for H240)  
Retaining bracket MS30

**Dimension table** - Dimensions in mm

| Designation                |      |          | Mass<br>m<br>≈kg | Dimensions      |     |                     |     |        |                 | Mounting dimensions |     |   |
|----------------------------|------|----------|------------------|-----------------|-----|---------------------|-----|--------|-----------------|---------------------|-----|---|
| Adapter sleeve<br>Complete | Nut  | Retainer |                  | d <sub>1H</sub> | d   | D <sub>m</sub><br>≈ | l   | c<br>≈ | d <sub>2G</sub> | R <sub>0</sub>      | e   | t |
| <b>H2330</b>               | KM30 | MB30     | 6,76             | <b>135</b>      | 150 | 195                 | 139 | 26     | M150X2          | -                   | -   | - |
| <b>H3330</b>               | KM30 | MB30     | 7,66             | <b>135</b>      | 150 | 195                 | 159 | 26     | M150X2          | -                   | -   | - |
| <b>H2332</b>               | KM32 | MB32     | 9,32             | <b>140</b>      | 160 | 210                 | 147 | 28     | M160X3          | -                   | -   | - |
| <b>H2332-HG</b>            | KM32 | MB32     | 9,32             | <b>140</b>      | 160 | 210                 | 147 | 28     | M160X3          | M6                  | 4,2 | 7 |
| <b>H3332</b>               | KM32 | MB32     | 10,7             | <b>140</b>      | 160 | 210                 | 170 | 28     | M160X3          | -                   | -   | - |
| <b>H3332-HG</b>            | KM32 | MB32     | 10,7             | <b>140</b>      | 160 | 210                 | 170 | 28     | M160X3          | M6                  | 4,2 | 7 |
| <b>H2334</b>               | KM34 | MB34     | 10,4             | <b>150</b>      | 170 | 220                 | 154 | 29     | M170X3          | -                   | -   | - |
| <b>H2334-HG</b>            | KM34 | MB34     | 10,4             | <b>150</b>      | 170 | 220                 | 154 | 29     | M170X3          | M6                  | 4,2 | 7 |
| <b>H3334</b>               | KM34 | MB34     | 11,7             | <b>150</b>      | 170 | 220                 | 175 | 29     | M170X3          | -                   | -   | - |
| <b>H3334-HG</b>            | KM34 | MB34     | 11,7             | <b>150</b>      | 170 | 220                 | 175 | 29     | M170X3          | M6                  | 4,2 | 7 |
| <b>H3136</b>               | KM36 | MB36     | 9,67             | <b>160</b>      | 180 | 230                 | 131 | 30     | M180X3          | -                   | -   | - |
| <b>H3136-HG</b>            | KM36 | MB36     | 9,67             | <b>160</b>      | 180 | 230                 | 131 | 30     | M180X3          | M6                  | 4,2 | 7 |
| <b>H2336</b>               | KM36 | MB36     | 11,6             | <b>160</b>      | 180 | 230                 | 161 | 30     | M180X3          | -                   | -   | - |
| <b>H2336-HG</b>            | KM36 | MB36     | 11,6             | <b>160</b>      | 180 | 230                 | 161 | 30     | M180X3          | M6                  | 4,2 | 7 |
| <b>H3336</b>               | KM36 | MB36     | 13,3             | <b>160</b>      | 180 | 230                 | 186 | 30     | M180X3          | -                   | -   | - |
| <b>H3336-HG</b>            | KM36 | MB36     | 13,3             | <b>160</b>      | 180 | 230                 | 186 | 30     | M180X3          | M6                  | 4,2 | 7 |
| <b>H3138</b>               | KM38 | MB38     | 11               | <b>170</b>      | 190 | 240                 | 141 | 31     | M190X3          | -                   | -   | - |
| <b>H3138-HG</b>            | KM38 | MB38     | 11               | <b>170</b>      | 190 | 240                 | 141 | 31     | M190X3          | M6                  | 4,2 | 7 |
| <b>H2338</b>               | KM38 | MB38     | 12,9             | <b>170</b>      | 190 | 240                 | 169 | 31     | M190X3          | -                   | -   | - |
| <b>H2338-HG</b>            | KM38 | MB38     | 12,9             | <b>170</b>      | 190 | 240                 | 169 | 31     | M190X3          | M6                  | 4,2 | 7 |
| <b>H24138</b>              | KM38 | MB38     | 11,9             | <b>170</b>      | 190 | 240                 | 172 | 31     | M190X3          | -                   | -   | - |
| <b>H24138-HG</b>           | KM38 | MB38     | 11,9             | <b>170</b>      | 190 | 240                 | 172 | 31     | M190X3          | M6                  | 4,2 | 7 |
| <b>H3338</b>               | KM38 | MB38     | 14,7             | <b>170</b>      | 190 | 240                 | 193 | 31     | M190X3          | -                   | -   | - |
| <b>H3338-HG</b>            | KM38 | MB38     | 14,7             | <b>170</b>      | 190 | 240                 | 193 | 31     | M190X3          | M6                  | 4,2 | 7 |
| <b>H3140</b>               | KM40 | MB40     | 12,3             | <b>180</b>      | 200 | 250                 | 150 | 32     | M200X3          | -                   | -   | - |
| <b>H3140-HG</b>            | KM40 | MB40     | 12,3             | <b>180</b>      | 200 | 250                 | 150 | 32     | M200X3          | M6                  | 4,2 | 7 |
| <b>H2340</b>               | KM40 | MB40     | 14,2             | <b>180</b>      | 200 | 250                 | 176 | 32     | M200X3          | -                   | -   | - |
| <b>H2340-HG</b>            | KM40 | MB40     | 14,2             | <b>180</b>      | 200 | 250                 | 176 | 32     | M200X3          | M6                  | 4,2 | 7 |
| <b>H24140</b>              | KM40 | MB40     | 13,4             | <b>180</b>      | 200 | 250                 | 185 | 32     | M200X3          | -                   | -   | - |
| <b>H24140-HG</b>           | KM40 | MB40     | 13,4             | <b>180</b>      | 200 | 250                 | 185 | 32     | M200X3          | M6                  | 4,2 | 7 |
| <b>H3340</b>               | KM40 | MB40     | 16,4             | <b>180</b>      | 200 | 250                 | 204 | 32     | M200X3          | -                   | -   | - |
| <b>H3340-HG</b>            | KM40 | MB40     | 16,4             | <b>180</b>      | 200 | 250                 | 204 | 32     | M200X3          | M6                  | 4,2 | 7 |



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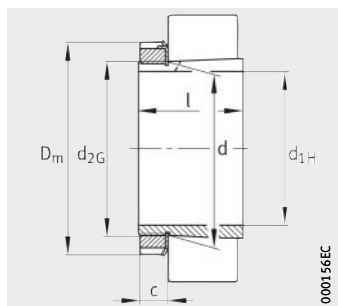
Hydraulic adapter sleeve  
(suffix HG)  
Mounting dimensions

| Dimension table (continued) - Dimensions in mm |        |          |                   |                 |     |                     |     |        |                     |                 |                     |     |   |
|--|--------|----------|-------------------|-----------------|-----|---------------------|-----|--------|---------------------|-----------------|---------------------|-----|---|
| Designation                                    |        |          | Mass<br>m<br>≈ kg | Dimensions      |     |                     |     |        |                     |                 | Mounting dimensions |     |   |
| Adapter sleeve<br>Complete                     | Nut    | Retainer |                   | d <sub>1H</sub> | d   | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub>      | e   | t |
| <b>H3044X</b>                                  | HM3044 | MS3044   | 10,5              | <b>200</b>      | 220 | 260                 | 126 | 30     | 40                  | Tr220X4         | –                   | –   | – |
| <b>H3044X-HG</b>                               | HM3044 | MS3044   | 10,5              | <b>200</b>      | 220 | 260                 | 126 | 30     | 40                  | Tr220X4         | M6                  | 4,2 | 7 |
| <b>H24044</b>                                  | HM3044 | MS3044   | 12,1              | <b>200</b>      | 220 | 260                 | 162 | 30     | 40                  | Tr220X4         | –                   | –   | – |
| <b>H24044-HG</b>                               | HM3044 | MS3044   | 12,1              | <b>200</b>      | 220 | 260                 | 162 | 30     | 40                  | Tr220X4         | M6                  | 4,2 | 7 |
| <b>H3144X</b>                                  | HM44T  | MB44     | 15,7              | <b>200</b>      | 220 | 280                 | 161 | 35     | 35                  | Tr220X4         | –                   | –   | – |
| <b>H3144X-HG</b>                               | HM44T  | MB44     | 15,7              | <b>200</b>      | 220 | 280                 | 161 | 35     | 35                  | Tr220X4         | M6                  | 4,2 | 7 |
| <b>H2344X</b>                                  | HM44T  | MB44     | 17,8              | <b>200</b>      | 220 | 280                 | 186 | 35     | 35                  | Tr220X4         | –                   | –   | – |
| <b>H2344X-HG</b>                               | HM44T  | MB44     | 17,8              | <b>200</b>      | 220 | 280                 | 186 | 35     | 35                  | Tr220X4         | M6                  | 4,2 | 7 |
| <b>H24144</b>                                  | HM44T  | MB44     | 17,1              | <b>200</b>      | 220 | 280                 | 199 | 35     | 35                  | Tr220X4         | –                   | –   | – |
| <b>H24144-HG</b>                               | HM44T  | MB44     | 17,1              | <b>200</b>      | 220 | 280                 | 199 | 35     | 35                  | Tr220X4         | M6                  | 4,2 | 7 |
| <b>H3344</b>                                   | HM44T  | MB44     | 21,1              | <b>200</b>      | 220 | 280                 | 223 | 35     | 35                  | Tr220X4         | –                   | –   | – |
| <b>H3344-HG</b>                                | HM44T  | MB44     | 21,1              | <b>200</b>      | 220 | 280                 | 223 | 35     | 35                  | Tr220X4         | M6                  | 4,2 | 7 |
| <b>H3948</b>                                   | HM3048 | MS3048   | 11,3              | <b>220</b>      | 240 | 290                 | 101 | 34     | 45                  | Tr240X4         | –                   | –   | – |
| <b>H3948-HG</b>                                | HM3048 | MS3048   | 11,3              | <b>220</b>      | 240 | 290                 | 101 | 34     | 45                  | Tr240X4         | M6                  | 4,2 | 7 |
| <b>H3048</b>                                   | HM3048 | MS3048   | 13,8              | <b>220</b>      | 240 | 290                 | 133 | 34     | 45                  | Tr240X4         | –                   | –   | – |
| <b>H3048-HG</b>                                | HM3048 | MS3048   | 13,8              | <b>220</b>      | 240 | 290                 | 133 | 34     | 45                  | Tr240X4         | M6                  | 4,2 | 7 |
| <b>H24048</b>                                  | HM3048 | MS3048   | 15,3              | <b>220</b>      | 240 | 290                 | 167 | 34     | 45                  | Tr240X4         | –                   | –   | – |
| <b>H24048-HG</b>                               | HM3048 | MS3048   | 15,3              | <b>220</b>      | 240 | 290                 | 167 | 34     | 45                  | Tr240X4         | M6                  | 4,2 | 7 |
| <b>H3148X</b>                                  | HM48T  | MB48     | 18,4              | <b>220</b>      | 240 | 300                 | 172 | 37     | 37                  | Tr240X4         | –                   | –   | – |
| <b>H3148X-HG</b>                               | HM48T  | MB48     | 18,4              | <b>220</b>      | 240 | 300                 | 172 | 37     | 37                  | Tr240X4         | M6                  | 4,2 | 7 |
| <b>H2348X</b>                                  | HM48T  | MB48     | 20,9              | <b>220</b>      | 240 | 300                 | 199 | 37     | 37                  | Tr240X4         | –                   | –   | – |
| <b>H2348X-HG</b>                               | HM48T  | MB48     | 20,9              | <b>220</b>      | 240 | 300                 | 199 | 37     | 37                  | Tr240X4         | M6                  | 4,2 | 7 |
| <b>H24148</b>                                  | HM48T  | MB48     | 19,9              | <b>220</b>      | 240 | 300                 | 212 | 37     | 37                  | Tr240X4         | –                   | –   | – |
| <b>H24148-HG</b>                               | HM48T  | MB48     | 19,9              | <b>220</b>      | 240 | 300                 | 212 | 37     | 37                  | Tr240X4         | M6                  | 4,2 | 7 |
| <b>H3348</b>                                   | HM48T  | MB48     | 25,1              | <b>220</b>      | 240 | 300                 | 240 | 37     | 37                  | Tr240X4         | –                   | –   | – |
| <b>H3348-HG</b>                                | HM48T  | MB48     | 25,1              | <b>220</b>      | 240 | 300                 | 240 | 37     | 37                  | Tr240X4         | M6                  | 4,2 | 7 |

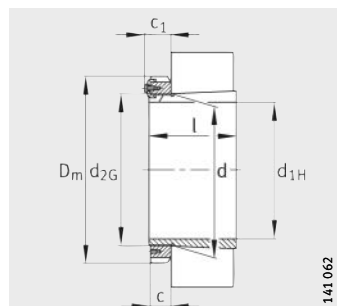


# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H241)  
Tab washer MB

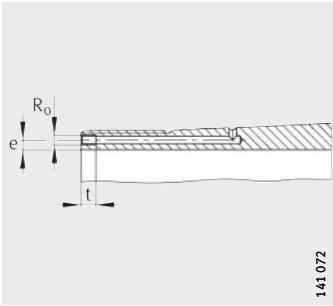


Taper 1:12  
(taper 1:30 for H240, H241)  
Retaining bracket MS30, MS31

**Dimension table** (continued) · Dimensions in mm

| Designation                |        |          | Mass<br>m<br>≈ kg | Dimensions      |     |                     |     |        |                     |                 | Mounting dimensions |     |   |
|----------------------------|--------|----------|-------------------|-----------------|-----|---------------------|-----|--------|---------------------|-----------------|---------------------|-----|---|
| Adapter sleeve<br>Complete | Nut    | Retainer |                   | d <sub>1H</sub> | d   | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub>      | e   | t |
| <b>H3952</b>               | HM3052 | MS3048   | 13,6              | <b>240</b>      | 260 | 310                 | 116 | 34     | 45                  | Tr260X4         | –                   | –   | – |
| <b>H3952-HG</b>            | HM3052 | MS3048   | 13,6              | <b>240</b>      | 260 | 310                 | 116 | 34     | 45                  | Tr260X4         | M6                  | 4,2 | 7 |
| <b>H3052X</b>              | HM3052 | MS3048   | 16                | <b>240</b>      | 260 | 310                 | 145 | 34     | 45                  | Tr260X4         | –                   | –   | – |
| <b>H3052X-HG</b>           | HM3052 | MS3048   | 16                | <b>240</b>      | 260 | 310                 | 145 | 34     | 45                  | Tr260X4         | M6                  | 4,2 | 7 |
| <b>H24052</b>              | HM3052 | MS3048   | 18,4              | <b>240</b>      | 260 | 310                 | 190 | 34     | 45                  | Tr260X4         | –                   | –   | – |
| <b>H24052-HG</b>           | HM3052 | MS3048   | 18,4              | <b>240</b>      | 260 | 310                 | 190 | 34     | 45                  | Tr260X4         | M6                  | 4,2 | 7 |
| <b>H3152X</b>              | HM52T  | MB52     | 23,5              | <b>240</b>      | 260 | 330                 | 190 | 38     | 38                  | Tr260X4         | –                   | –   | – |
| <b>H3152X-HG</b>           | HM52T  | MB52     | 23,5              | <b>240</b>      | 260 | 330                 | 190 | 38     | 38                  | Tr260X4         | M6                  | 4,2 | 7 |
| <b>H2352X</b>              | HM52T  | MB52     | 25,7              | <b>240</b>      | 260 | 330                 | 211 | 38     | 38                  | Tr260X4         | –                   | –   | – |
| <b>H2352X-HG</b>           | HM52T  | MB52     | 25,7              | <b>240</b>      | 260 | 330                 | 211 | 38     | 38                  | Tr260X4         | M6                  | 4,2 | 7 |
| <b>H24152</b>              | HM52T  | MB52     | 25,2              | <b>240</b>      | 260 | 330                 | 235 | 38     | 38                  | Tr260X4         | –                   | –   | – |
| <b>H24152-HG</b>           | HM52T  | MB52     | 25,2              | <b>240</b>      | 260 | 330                 | 235 | 38     | 38                  | Tr260X4         | M6                  | 4,2 | 7 |
| <b>H3352</b>               | HM52T  | MB52     | 30,5              | <b>240</b>      | 260 | 330                 | 253 | 38     | 38                  | Tr260X4         | –                   | –   | – |
| <b>H3352-HG</b>            | HM52T  | MB52     | 30,5              | <b>240</b>      | 260 | 330                 | 253 | 38     | 38                  | Tr260X4         | M6                  | 4,2 | 7 |
| <b>H3956</b>               | HM3056 | MS3056   | 15,6              | <b>260</b>      | 280 | 330                 | 121 | 38     | 49                  | Tr280X4         | –                   | –   | – |
| <b>H3956-HG</b>            | HM3056 | MS3056   | 15,6              | <b>260</b>      | 280 | 330                 | 121 | 38     | 49                  | Tr280X4         | M6                  | 4,2 | 7 |
| <b>H3056</b>               | HM3056 | MS3056   | 18,5              | <b>260</b>      | 280 | 330                 | 152 | 38     | 49                  | Tr280X4         | –                   | –   | – |
| <b>H3056-HG</b>            | HM3056 | MS3056   | 18,5              | <b>260</b>      | 280 | 330                 | 152 | 38     | 49                  | Tr280X4         | M6                  | 4,2 | 7 |
| <b>H24056</b>              | HM3056 | MS3056   | 20,9              | <b>260</b>      | 280 | 330                 | 195 | 38     | 49                  | Tr280X4         | –                   | –   | – |
| <b>H24056-HG</b>           | HM3056 | MS3056   | 20,9              | <b>260</b>      | 280 | 330                 | 195 | 38     | 49                  | Tr280X4         | M6                  | 4,2 | 7 |
| <b>H3156X</b>              | HM56T  | MB56     | 26,4              | <b>260</b>      | 280 | 350                 | 195 | 39     | 39                  | Tr280X4         | –                   | –   | – |
| <b>H3156X-HG</b>           | HM56T  | MB56     | 26,4              | <b>260</b>      | 280 | 350                 | 195 | 39     | 39                  | Tr280X4         | M6                  | 4,2 | 7 |
| <b>H2356X</b>              | HM56T  | MB56     | 29,8              | <b>260</b>      | 280 | 350                 | 224 | 39     | 39                  | Tr280X4         | –                   | –   | – |
| <b>H2356X-HG</b>           | HM56T  | MB56     | 29,8              | <b>260</b>      | 280 | 350                 | 224 | 39     | 39                  | Tr280X4         | M6                  | 4,2 | 7 |
| <b>H24156</b>              | HM56T  | MB56     | 28                | <b>260</b>      | 280 | 350                 | 238 | 39     | 39                  | Tr280X4         | –                   | –   | – |
| <b>H24156-HG</b>           | HM56T  | MB56     | 28                | <b>260</b>      | 280 | 350                 | 238 | 39     | 39                  | Tr280X4         | M6                  | 4,2 | 7 |
| <b>H3356</b>               | HM56T  | MB56     | 36                | <b>260</b>      | 280 | 350                 | 273 | 39     | 39                  | Tr280X4         | –                   | –   | – |
| <b>H3356-HG</b>            | HM56T  | MB56     | 36                | <b>260</b>      | 280 | 350                 | 273 | 39     | 39                  | Tr280X4         | M6                  | 4,2 | 7 |





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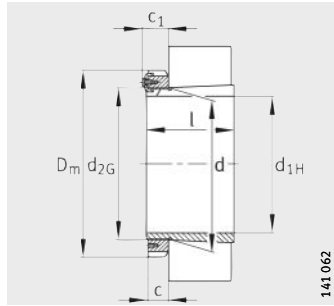
Hydraulic adapter sleeve  
(suffix HG)  
Mounting dimensions

**Dimension table** (continued) - Dimensions in mm

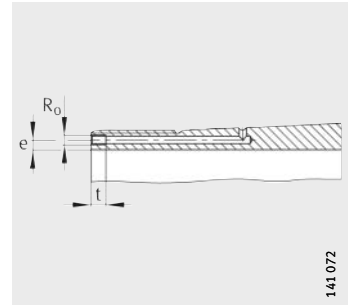
| Designation                |        |          | Mass<br>m<br>≈ kg | Dimensions      |     |                     |     |        |                     |                 | Mounting dimensions |     |   |
|----------------------------|--------|----------|-------------------|-----------------|-----|---------------------|-----|--------|---------------------|-----------------|---------------------|-----|---|
| Adapter sleeve<br>Complete | Nut    | Retainer |                   | d <sub>1H</sub> | d   | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub>      | e   | t |
| <b>H3960</b>               | HM3060 | MS3060   | 20,9              | <b>280</b>      | 300 | 360                 | 140 | 42     | 53                  | Tr300X4         | –                   | –   | – |
| <b>H3960-HG</b>            | HM3060 | MS3060   | 20,9              | <b>280</b>      | 300 | 360                 | 140 | 42     | 53                  | Tr300X4         | M6                  | 4,2 | 7 |
| <b>H3060</b>               | HM3060 | MS3060   | 23,8              | <b>280</b>      | 300 | 360                 | 168 | 42     | 53                  | Tr300X4         | –                   | –   | – |
| <b>H3060-HG</b>            | HM3060 | MS3060   | 23,8              | <b>280</b>      | 300 | 360                 | 168 | 42     | 53                  | Tr300X4         | M6                  | 4,2 | 7 |
| <b>H24060</b>              | HM3060 | MS3060   | 26,9              | <b>280</b>      | 300 | 360                 | 220 | 42     | 53                  | Tr300X4         | –                   | –   | – |
| <b>H24060-HG</b>           | HM3060 | MS3060   | 26,9              | <b>280</b>      | 300 | 360                 | 220 | 42     | 53                  | Tr300X4         | M6                  | 4,2 | 7 |
| <b>H3160</b>               | HM3160 | MS3160   | 30,6              | <b>280</b>      | 300 | 380                 | 208 | 40     | 53                  | Tr300X4         | –                   | –   | – |
| <b>H3160-HG</b>            | HM3160 | MS3160   | 30,6              | <b>280</b>      | 300 | 380                 | 208 | 40     | 53                  | Tr300X4         | M6                  | 4,2 | 7 |
| <b>H3260</b>               | HM3160 | MS3160   | 34,7              | <b>280</b>      | 300 | 380                 | 240 | 40     | 53                  | Tr300X4         | –                   | –   | – |
| <b>H3260-HG</b>            | HM3160 | MS3160   | 34,7              | <b>280</b>      | 300 | 380                 | 240 | 40     | 53                  | Tr300X4         | M6                  | 4,2 | 7 |
| <b>H24160</b>              | HM3160 | MS3160   | 32,7              | <b>280</b>      | 300 | 380                 | 258 | 40     | 53                  | Tr300X4         | –                   | –   | – |
| <b>H24160-HG</b>           | HM3160 | MS3160   | 32,7              | <b>280</b>      | 300 | 380                 | 258 | 40     | 53                  | Tr300X4         | M6                  | 4,2 | 7 |
| <b>H3360</b>               | HM3160 | MS3160   | 40,8              | <b>280</b>      | 300 | 380                 | 284 | 40     | 53                  | Tr300X4         | –                   | –   | – |
| <b>H3360-HG</b>            | HM3160 | MS3160   | 40,8              | <b>280</b>      | 300 | 380                 | 284 | 40     | 53                  | Tr300X4         | M6                  | 4,2 | 7 |
| <b>H3964-HG</b>            | HM3064 | MS3064   | 22                | <b>300</b>      | 320 | 380                 | 140 | 42     | 56                  | Tr320X5         | M6                  | 3,5 | 7 |
| <b>H3064-HG</b>            | HM3064 | MS3064   | 25,4              | <b>300</b>      | 320 | 380                 | 171 | 42     | 56                  | Tr320X5         | M6                  | 3,5 | 7 |
| <b>H24064-HG</b>           | HM3064 | MS3064   | 28,4              | <b>300</b>      | 320 | 380                 | 220 | 42     | 56                  | Tr320X5         | M6                  | 3,5 | 7 |
| <b>H3164-HG</b>            | HM3164 | MS3164   | 35,4              | <b>300</b>      | 320 | 400                 | 226 | 42     | 56                  | Tr320X5         | M6                  | 3,5 | 7 |
| <b>H3264-HG</b>            | HM3164 | MS3164   | 40                | <b>300</b>      | 320 | 400                 | 258 | 42     | 56                  | Tr320X5         | M6                  | 3,5 | 7 |
| <b>H24164-HG</b>           | HM3164 | MS3164   | 37,4              | <b>300</b>      | 320 | 400                 | 278 | 42     | 56                  | Tr320X5         | M6                  | 3,5 | 7 |
| <b>H3364-HG</b>            | HM3164 | MS3164   | 47,8              | <b>300</b>      | 320 | 400                 | 308 | 42     | 56                  | Tr320X5         | M6                  | 3,5 | 7 |
| <b>H3968-HG</b>            | HM3068 | MS3064   | 24,8              | <b>320</b>      | 340 | 400                 | 144 | 45     | 57                  | Tr340X5         | M6                  | 3,5 | 7 |
| <b>H3068-HG</b>            | HM3068 | MS3064   | 30                | <b>320</b>      | 340 | 400                 | 187 | 45     | 57                  | Tr340X5         | M6                  | 3,5 | 7 |
| <b>H24068-HG</b>           | HM3068 | MS3064   | 33,8              | <b>320</b>      | 340 | 400                 | 244 | 45     | 57                  | Tr340X5         | M6                  | 3,5 | 7 |
| <b>H3168-HG</b>            | HM3168 | MS3168   | 50,1              | <b>320</b>      | 340 | 440                 | 254 | 55     | 70                  | Tr340X5         | M6                  | 3,5 | 7 |
| <b>H3268-HG</b>            | HM3168 | MS3168   | 55,4              | <b>320</b>      | 340 | 440                 | 288 | 55     | 70                  | Tr340X5         | M6                  | 3,5 | 7 |
| <b>H24168-HG</b>           | HM3168 | MS3168   | 53                | <b>320</b>      | 340 | 440                 | 317 | 55     | 70                  | Tr340X5         | M6                  | 3,5 | 7 |
| <b>H3368-HG</b>            | HM3168 | MS3168   | 63,6              | <b>320</b>      | 340 | 440                 | 336 | 55     | 70                  | Tr340X5         | M6                  | 3,5 | 7 |
| <b>H3972-HG</b>            | HM3072 | MS3072   | 25,9              | <b>340</b>      | 360 | 420                 | 144 | 45     | 57                  | Tr360X5         | M6                  | 3,5 | 7 |
| <b>H3072-HG</b>            | HM3072 | MS3072   | 31,6              | <b>340</b>      | 360 | 420                 | 188 | 45     | 57                  | Tr360X5         | M6                  | 3,5 | 7 |
| <b>H24072-HG</b>           | HM3072 | MS3072   | 35,5              | <b>340</b>      | 360 | 420                 | 244 | 45     | 57                  | Tr360X5         | M6                  | 3,5 | 7 |
| <b>H3172-HG</b>            | HM3172 | MS3168   | 54,3              | <b>340</b>      | 360 | 460                 | 259 | 58     | 73                  | Tr360X5         | M6                  | 3,5 | 7 |
| <b>H3272-HG</b>            | HM3172 | MS3168   | 61                | <b>340</b>      | 360 | 460                 | 299 | 58     | 73                  | Tr360X5         | M6                  | 3,5 | 7 |
| <b>H24172-HG</b>           | HM3172 | MS3168   | 57,1              | <b>340</b>      | 360 | 460                 | 321 | 58     | 73                  | Tr360X5         | M6                  | 3,5 | 7 |
| <b>H3372-HG</b>            | HM3172 | MS3168   | 71,8              | <b>340</b>      | 360 | 460                 | 357 | 58     | 73                  | Tr360X5         | M6                  | 3,5 | 7 |

# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241)  
Retaining bracket MS30, MS31



Hydraulic adapter sleeve  
(suffix HG)  
Mounting dimensions

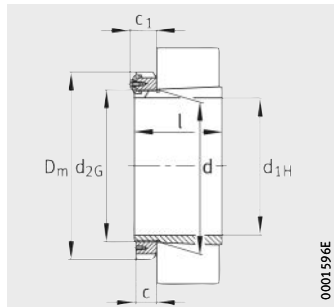
| Dimension table (continued) · Dimensions in mm |        |          |                  |                 |     |                     |     |        |                     |                 |                     |     |    |
|--|--------|----------|------------------|-----------------|-----|---------------------|-----|--------|---------------------|-----------------|---------------------|-----|----|
| Designation                                    |        |          | Mass<br>m<br>≈kg | Dimensions      |     |                     |     |        |                     |                 | Mounting dimensions |     |    |
| Adapter sleeve<br>Complete                     | Nut    | Retainer |                  | d <sub>1H</sub> | d   | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| <b>H3976-HG</b>                                | HM3076 | MS3076   | 32,1             | <b>360</b>      | 380 | 450                 | 164 | 48     | 62                  | Tr380X5         | M6                  | 3,5 | 7  |
| <b>H3076-HG</b>                                | HM3076 | MS3076   | 36,2             | <b>360</b>      | 380 | 450                 | 193 | 48     | 62                  | Tr380X5         | M6                  | 3,5 | 7  |
| <b>H24076-HG</b>                               | HM3076 | MS3076   | 40,1             | <b>360</b>      | 380 | 450                 | 248 | 48     | 62                  | Tr380X5         | M6                  | 3,5 | 7  |
| <b>H3176-HG</b>                                | HM3176 | MS3176   | 62,4             | <b>360</b>      | 380 | 490                 | 264 | 60     | 75                  | Tr380X5         | M6                  | 3,5 | 7  |
| <b>H3276-HG</b>                                | HM3176 | MS3176   | 70,7             | <b>360</b>      | 380 | 490                 | 310 | 60     | 75                  | Tr380X5         | M6                  | 3,5 | 7  |
| <b>H24176-HG</b>                               | HM3176 | MS3176   | 64,9             | <b>360</b>      | 380 | 490                 | 323 | 60     | 75                  | Tr380X5         | M6                  | 3,5 | 7  |
| <b>H3376-HG</b>                                | HM3176 | MS3176   | 82,8             | <b>360</b>      | 380 | 490                 | 370 | 60     | 75                  | Tr380X5         | M6                  | 3,5 | 7  |
| <b>H3980-HG</b>                                | HM3080 | MS3076   | 35,4             | <b>380</b>      | 400 | 470                 | 168 | 52     | 66                  | Tr400X5         | M6                  | 3,5 | 7  |
| <b>H3080-HG</b>                                | HM3080 | MS3076   | 41,7             | <b>380</b>      | 400 | 470                 | 210 | 52     | 66                  | Tr400X5         | M6                  | 3,5 | 7  |
| <b>H24080-HG</b>                               | HM3080 | MS3076   | 46,4             | <b>380</b>      | 400 | 470                 | 272 | 52     | 66                  | Tr400X5         | M6                  | 3,5 | 7  |
| <b>H3180-HG</b>                                | HM3180 | MS3180   | 71,3             | <b>380</b>      | 400 | 520                 | 272 | 62     | 81                  | Tr400X5         | M6                  | 3,5 | 7  |
| <b>H3280-HG</b>                                | HM3180 | MS3180   | 82,1             | <b>380</b>      | 400 | 520                 | 328 | 62     | 81                  | Tr400X5         | M6                  | 3,5 | 7  |
| <b>H24180-HG</b>                               | HM3180 | MS3180   | 73,8             | <b>380</b>      | 400 | 520                 | 332 | 62     | 81                  | Tr400X5         | M6                  | 3,5 | 7  |
| <b>H3380-HG</b>                                | HM3180 | MS3180   | 93,4             | <b>380</b>      | 400 | 520                 | 380 | 62     | 81                  | Tr400X5         | M6                  | 3,5 | 7  |
| <b>H3984-HG</b>                                | HM3084 | MS3084   | 36,9             | <b>400</b>      | 420 | 490                 | 168 | 52     | 66                  | Tr420X5         | M6                  | 3,5 | 7  |
| <b>H3084X-HG</b>                               | HM3084 | MS3084   | 43,8             | <b>400</b>      | 420 | 490                 | 212 | 52     | 66                  | Tr420X5         | M6                  | 3,5 | 7  |
| <b>H24084-HG</b>                               | HM3084 | MS3084   | 48,6             | <b>400</b>      | 420 | 490                 | 274 | 52     | 66                  | Tr420X5         | M6                  | 3,5 | 7  |
| <b>H3184-HG</b>                                | HM3184 | MS3180   | 85,1             | <b>400</b>      | 420 | 540                 | 304 | 70     | 89                  | Tr420X5         | M6                  | 3,5 | 7  |
| <b>H3284-HG</b>                                | HM3184 | MS3180   | 95,3             | <b>400</b>      | 420 | 540                 | 352 | 70     | 89                  | Tr420X5         | M6                  | 3,5 | 7  |
| <b>H24184-HG</b>                               | HM3184 | MS3180   | 87,8             | <b>400</b>      | 420 | 540                 | 372 | 70     | 89                  | Tr420X5         | M6                  | 3,5 | 7  |
| <b>H3384-HG</b>                                | HM3184 | MS3180   | 105              | <b>400</b>      | 420 | 540                 | 395 | 70     | 89                  | Tr420X5         | M6                  | 3,5 | 7  |
| <b>H3988-HG</b>                                | HM3088 | MS3088   | 59               | <b>410</b>      | 440 | 520                 | 189 | 60     | 75                  | Tr440X5         | M8                  | 6,5 | 12 |
| <b>H3088-HG</b>                                | HM3088 | MS3088   | 67,7             | <b>410</b>      | 440 | 520                 | 228 | 60     | 75                  | Tr440X5         | M8                  | 6,5 | 12 |
| <b>H24088-HG</b>                               | HM3088 | MS3088   | 76,4             | <b>410</b>      | 440 | 520                 | 294 | 60     | 75                  | Tr440X5         | M8                  | 6,5 | 12 |
| <b>H3188-HG</b>                                | HM3188 | MS3188   | 105              | <b>410</b>      | 440 | 560                 | 307 | 70     | 89                  | Tr440X5         | M8                  | 6,5 | 12 |
| <b>H3288-HG</b>                                | HM3188 | MS3188   | 120              | <b>410</b>      | 440 | 560                 | 361 | 70     | 89                  | Tr440X5         | M8                  | 6,5 | 12 |
| <b>H24188-HG</b>                               | HM3188 | MS3188   | 111              | <b>410</b>      | 440 | 560                 | 372 | 70     | 89                  | Tr440X5         | M8                  | 6,5 | 12 |
| <b>H3388-HG</b>                                | HM3188 | MS3188   | 140              | <b>410</b>      | 440 | 560                 | 426 | 70     | 89                  | Tr440X5         | M8                  | 6,5 | 12 |
| <b>H3992-HG</b>                                | HM3092 | MS3088   | 61,4             | <b>430</b>      | 460 | 540                 | 189 | 60     | 75                  | Tr460X5         | M8                  | 6,5 | 12 |
| <b>H3092-HG</b>                                | HM3092 | MS3088   | 71,8             | <b>430</b>      | 460 | 540                 | 234 | 60     | 75                  | Tr460X5         | M8                  | 6,5 | 12 |
| <b>H24092-HG</b>                               | HM3092 | MS3088   | 80,8             | <b>430</b>      | 460 | 540                 | 300 | 60     | 75                  | Tr460X5         | M8                  | 6,5 | 12 |
| <b>H3192-HG</b>                                | HM3192 | MS3188   | 118              | <b>430</b>      | 460 | 580                 | 326 | 75     | 94                  | Tr460X5         | M8                  | 6,5 | 12 |
| <b>H3292-HG</b>                                | HM3192 | MS3188   | 134              | <b>430</b>      | 460 | 580                 | 382 | 75     | 94                  | Tr460X5         | M8                  | 6,5 | 12 |
| <b>H24192-HG</b>                               | HM3192 | MS3188   | 124              | <b>430</b>      | 460 | 580                 | 398 | 75     | 94                  | Tr460X5         | M8                  | 6,5 | 12 |
| <b>H3392-HG</b>                                | HM3192 | MS3188   | 157              | <b>430</b>      | 460 | 580                 | 451 | 75     | 94                  | Tr460X5         | M8                  | 6,5 | 12 |

| Dimension table (continued) - Dimensions in mm |          |          |                  |                 |     |                     |     |        |                     |                 |                        |     |    |
|--|----------|----------|------------------|-----------------|-----|---------------------|-----|--------|---------------------|-----------------|------------------------|-----|----|
| Designation                                    |          |          | Mass<br>m<br>≈kg | Dimensions      |     |                     |     |        |                     |                 | Mounting<br>dimensions |     |    |
| Adapter sleeve<br>Complete                     | Nut      | Retainer |                  | d <sub>1H</sub> | d   | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub>         | e   | t  |
| <b>H3996-HG</b>                                | HM3096   | MS3096   | 66,8             | <b>450</b>      | 480 | 560                 | 200 | 60     | 75                  | Tr480X5         | M8                     | 6,5 | 12 |
| <b>H3096-HG</b>                                | HM3096   | MS3096   | 75,9             | <b>450</b>      | 480 | 560                 | 237 | 60     | 75                  | Tr480X5         | M8                     | 6,5 | 12 |
| <b>H24096-HG</b>                               | HM3096   | MS3096   | 84,7             | <b>450</b>      | 480 | 560                 | 301 | 60     | 75                  | Tr480X5         | M8                     | 6,5 | 12 |
| <b>H3196-HG</b>                                | HM3196   | MS3196   | 135              | <b>450</b>      | 480 | 620                 | 335 | 75     | 94                  | Tr480X5         | M8                     | 6,5 | 12 |
| <b>H3296-HG</b>                                | HM3196   | MS3196   | 155              | <b>450</b>      | 480 | 620                 | 397 | 75     | 94                  | Tr480X5         | M8                     | 6,5 | 12 |
| <b>H24196-HG</b>                               | HM3196   | MS3196   | 142              | <b>450</b>      | 480 | 620                 | 408 | 75     | 94                  | Tr480X5         | M8                     | 6,5 | 12 |
| <b>H3396-HG</b>                                | HM3196   | MS3196   | 177              | <b>450</b>      | 480 | 620                 | 462 | 75     | 94                  | Tr480X5         | M8                     | 6,5 | 12 |
| <b>H39/500-HG</b>                              | HM30/500 | MS3096   | 75,2             | <b>470</b>      | 500 | 580                 | 208 | 68     | 83                  | Tr500X5         | M8                     | 6,5 | 12 |
| <b>H30/500-HG</b>                              | HM30/500 | MS3096   | 85,2             | <b>470</b>      | 500 | 580                 | 247 | 68     | 83                  | Tr500X5         | M8                     | 6,5 | 12 |
| <b>H240/500-HG</b>                             | HM30/500 | MS3096   | 93,8             | <b>470</b>      | 500 | 580                 | 309 | 68     | 83                  | Tr500X5         | M8                     | 6,5 | 12 |
| <b>H31/500-HG</b>                              | HM31/500 | MS31/500 | 145              | <b>470</b>      | 500 | 630                 | 356 | 80     | 99                  | Tr500X5         | M8                     | 6,5 | 12 |
| <b>H32/500-HG</b>                              | HM31/500 | MS31/500 | 170              | <b>470</b>      | 500 | 630                 | 428 | 80     | 99                  | Tr500X5         | M8                     | 6,5 | 12 |
| <b>H241/500-HG</b>                             | HM31/500 | MS31/500 | 151              | <b>470</b>      | 500 | 630                 | 430 | 80     | 99                  | Tr500X5         | M8                     | 6,5 | 12 |
| <b>H33/500-HG</b>                              | HM31/500 | MS31/500 | 189              | <b>470</b>      | 500 | 630                 | 480 | 80     | 99                  | Tr500X5         | M8                     | 6,5 | 12 |
| <b>H39/530-HG</b>                              | HM30/530 | MS30/530 | 89               | <b>500</b>      | 530 | 630                 | 216 | 68     | 89                  | Tr530X6         | M8                     | 6   | 12 |
| <b>H30/530-HG</b>                              | HM30/530 | MS30/530 | 103              | <b>500</b>      | 530 | 630                 | 265 | 68     | 89                  | Tr530X6         | M8                     | 6   | 12 |
| <b>H240/530-HG</b>                             | HM30/530 | MS30/530 | 115              | <b>500</b>      | 530 | 630                 | 343 | 68     | 89                  | Tr530X6         | M8                     | 6   | 12 |
| <b>H31/530-HG</b>                              | HM31/530 | MS31/530 | 161              | <b>500</b>      | 530 | 670                 | 364 | 80     | 102                 | Tr530X6         | M8                     | 6   | 12 |
| <b>H241/530-HG</b>                             | HM31/530 | MS31/530 | 167              | <b>500</b>      | 530 | 670                 | 440 | 80     | 102                 | Tr530X6         | M8                     | 6   | 12 |
| <b>H32/530-HG</b>                              | HM31/530 | MS31/530 | 192              | <b>500</b>      | 530 | 670                 | 447 | 80     | 102                 | Tr530X6         | M8                     | 6   | 12 |
| <b>H33/530-HG</b>                              | HM31/530 | MS31/530 | 215              | <b>500</b>      | 530 | 670                 | 504 | 80     | 102                 | Tr530X6         | M8                     | 6   | 12 |
| <b>H39/560-HG</b>                              | HM30/560 | MS30/560 | 95,6             | <b>530</b>      | 560 | 650                 | 227 | 75     | 96                  | Tr560X6         | M8                     | 6   | 12 |
| <b>H30/560-HG</b>                              | HM30/560 | MS30/560 | 112              | <b>530</b>      | 560 | 650                 | 282 | 75     | 96                  | Tr560X6         | M8                     | 6   | 12 |
| <b>H240/560-HG</b>                             | HM30/560 | MS30/560 | 124              | <b>530</b>      | 560 | 650                 | 358 | 75     | 96                  | Tr560X6         | M8                     | 6   | 12 |
| <b>H31/560-HG</b>                              | HM31/560 | MS31/560 | 184              | <b>530</b>      | 560 | 710                 | 377 | 85     | 107                 | Tr560X6         | M8                     | 6   | 12 |
| <b>H32/560-HG</b>                              | HM31/560 | MS31/560 | 218              | <b>530</b>      | 560 | 710                 | 462 | 85     | 107                 | Tr560X6         | M8                     | 6   | 12 |
| <b>H241/560-HG</b>                             | HM31/560 | MS31/560 | 195              | <b>530</b>      | 560 | 710                 | 468 | 85     | 107                 | Tr560X6         | M8                     | 6   | 12 |
| <b>H33/560-HG</b>                              | HM31/560 | MS31/560 | 250              | <b>530</b>      | 560 | 710                 | 535 | 85     | 107                 | Tr560X6         | M8                     | 6   | 12 |
| <b>H39/600-HG</b>                              | HM30/600 | MS30/530 | 129              | <b>560</b>      | 600 | 700                 | 239 | 75     | 96                  | Tr600X6         | G1/8                   | 8   | 12 |
| <b>H30/600-HG</b>                              | HM30/600 | MS30/530 | 149              | <b>560</b>      | 600 | 700                 | 289 | 75     | 96                  | Tr600X6         | G1/8                   | 8   | 12 |
| <b>H240/600-HG</b>                             | HM30/600 | MS30/530 | 171              | <b>560</b>      | 600 | 700                 | 377 | 75     | 96                  | Tr600X6         | G1/8                   | 8   | 12 |
| <b>H31/600-HG</b>                              | HM31/600 | MS31/560 | 234              | <b>560</b>      | 600 | 750                 | 399 | 85     | 107                 | Tr600X6         | G1/8                   | 8   | 12 |
| <b>H32/600-HG</b>                              | HM31/600 | MS31/560 | 279              | <b>560</b>      | 600 | 750                 | 487 | 85     | 107                 | Tr600X6         | G1/8                   | 8   | 12 |
| <b>H241/600-HG</b>                             | HM31/600 | MS31/560 | 249              | <b>560</b>      | 600 | 750                 | 490 | 85     | 107                 | Tr600X6         | G1/8                   | 8   | 12 |
| <b>H33/600-HG</b>                              | HM31/600 | MS31/560 | 320              | <b>560</b>      | 600 | 750                 | 561 | 85     | 107                 | Tr600X6         | G1/8                   | 8   | 12 |

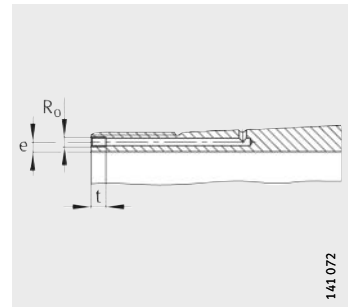


# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241,  
H248, H249)



Hydraulic adapter sleeve  
(suffix HG)  
Mounting dimensions

| Dimension table (continued) · Dimensions in mm |          |          |                   |                 |     |                     |     |        |                     |                 |                |                     |    |  |
|--|----------|----------|-------------------|-----------------|-----|---------------------|-----|--------|---------------------|-----------------|----------------|---------------------|----|--|
| Designation                                    |          |          | Mass<br>m<br>≈ kg | Dimensions      |     |                     |     |        |                     |                 |                | Mounting dimensions |    |  |
| Adapter sleeve Complete                        | Nut      | Retainer |                   | d <sub>1H</sub> | d   | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub> | e                   | t  |  |
| <b>H39/630-HG</b>                              | HM30/630 | MS30/630 | 123               | <b>600</b>      | 630 | 730                 | 254 | 75     | 96                  | Tr630X6         | M8             | 6                   | 12 |  |
| <b>H30/630-HG</b>                              | HM30/630 | MS30/630 | 139               | <b>600</b>      | 630 | 730                 | 301 | 75     | 96                  | Tr630X6         | M8             | 6                   | 12 |  |
| <b>H240/630-HG</b>                             | HM30/630 | MS30/630 | 157               | <b>600</b>      | 630 | 730                 | 395 | 75     | 96                  | Tr630X6         | M8             | 6                   | 12 |  |
| <b>H31/630-HG</b>                              | HM31/630 | MS31/630 | 251               | <b>600</b>      | 630 | 800                 | 424 | 95     | 117                 | Tr630X6         | M8             | 6                   | 12 |  |
| <b>H32/630-HG</b>                              | HM31/630 | MS31/630 | 297               | <b>600</b>      | 630 | 800                 | 521 | 95     | 117                 | Tr630X6         | M8             | 6                   | 12 |  |
| <b>H241/630-HG</b>                             | HM31/630 | MS31/630 | 263               | <b>600</b>      | 630 | 800                 | 525 | 95     | 117                 | Tr630X6         | M8             | 6                   | 12 |  |
| <b>H33/630-HG</b>                              | HM31/630 | MS31/630 | 338               | <b>600</b>      | 630 | 800                 | 597 | 95     | 117                 | Tr630X6         | M8             | 6                   | 12 |  |
| <b>H39/670-HG</b>                              | HM30/670 | MS30/670 | 166               | <b>630</b>      | 670 | 780                 | 264 | 80     | 101                 | Tr670X6         | G1/8           | 8                   | 12 |  |
| <b>H30/670-HG</b>                              | HM30/670 | MS30/670 | 194               | <b>630</b>      | 670 | 780                 | 324 | 80     | 101                 | Tr670X6         | G1/8           | 8                   | 12 |  |
| <b>H240/670-HG</b>                             | HM30/670 | MS30/670 | 218               | <b>630</b>      | 670 | 780                 | 418 | 80     | 101                 | Tr670X6         | G1/8           | 8                   | 12 |  |
| <b>H31/670-HG</b>                              | HM31/670 | MS31/670 | 341               | <b>630</b>      | 670 | 850                 | 456 | 106    | 128                 | Tr670X6         | G1/8           | 8                   | 12 |  |
| <b>H241/670-HG</b>                             | HM31/670 | MS31/670 | 355               | <b>630</b>      | 670 | 850                 | 548 | 106    | 128                 | Tr670X6         | G1/8           | 8                   | 12 |  |
| <b>H32/670-HG</b>                              | HM31/670 | MS31/670 | 402               | <b>630</b>      | 670 | 850                 | 558 | 106    | 128                 | Tr670X6         | G1/8           | 8                   | 12 |  |
| <b>H33/670-HG</b>                              | HM31/670 | MS31/670 | 453               | <b>630</b>      | 670 | 850                 | 635 | 106    | 128                 | Tr670X6         | G1/8           | 8                   | 12 |  |
| <b>H39/710-HG</b>                              | HM30/710 | MS30/710 | 200               | <b>670</b>      | 710 | 830                 | 286 | 90     | 111                 | Tr710X7         | G1/8           | 8                   | 12 |  |
| <b>H30/710-HG</b>                              | HM30/710 | MS30/710 | 228               | <b>670</b>      | 710 | 830                 | 342 | 90     | 111                 | Tr710X7         | G1/8           | 8                   | 12 |  |
| <b>H240/710-HG</b>                             | HM30/710 | MS30/710 | 254               | <b>670</b>      | 710 | 830                 | 438 | 90     | 111                 | Tr710X7         | G1/8           | 8                   | 12 |  |
| <b>H31/710-HG</b>                              | HM31/710 | MS31/710 | 376               | <b>670</b>      | 710 | 900                 | 467 | 106    | 131                 | Tr710X7         | G1/8           | 8                   | 12 |  |
| <b>H32/710-HG</b>                              | HM31/710 | MS31/710 | 444               | <b>670</b>      | 710 | 900                 | 572 | 106    | 131                 | Tr710X7         | G1/8           | 8                   | 12 |  |
| <b>H241/710-HG</b>                             | HM31/710 | MS31/710 | 397               | <b>670</b>      | 710 | 900                 | 577 | 106    | 131                 | Tr710X7         | G1/8           | 8                   | 12 |  |
| <b>H33/710-HG</b>                              | HM31/710 | MS31/710 | 501               | <b>670</b>      | 710 | 900                 | 652 | 106    | 131                 | Tr710X7         | G1/8           | 8                   | 12 |  |
| <b>H39/750-HG</b>                              | HM30/750 | MS30/750 | 213               | <b>710</b>      | 750 | 870                 | 291 | 90     | 111                 | Tr750X7         | G1/8           | 8                   | 12 |  |
| <b>H240/750-HG</b>                             | HM30/750 | MS30/750 | 236               | <b>710</b>      | 750 | 870                 | 367 | 90     | 111                 | Tr750X7         | G1/8           | 8                   | 12 |  |
| <b>H30/750-HG</b>                              | HM30/750 | MS30/750 | 248               | <b>710</b>      | 750 | 870                 | 356 | 90     | 111                 | Tr750X7         | G1/8           | 8                   | 12 |  |
| <b>H240/750-HG</b>                             | HM30/750 | MS30/750 | 278               | <b>710</b>      | 750 | 870                 | 460 | 90     | 111                 | Tr750X7         | G1/8           | 8                   | 12 |  |
| <b>H31/750-HG</b>                              | HM31/750 | MS31/750 | 432               | <b>710</b>      | 750 | 950                 | 493 | 112    | 137                 | Tr750X7         | G1/8           | 8                   | 12 |  |
| <b>H32/750-HG</b>                              | HM31/750 | MS31/750 | 508               | <b>710</b>      | 750 | 950                 | 603 | 112    | 137                 | Tr750X7         | G1/8           | 8                   | 12 |  |
| <b>H241/750-HG</b>                             | HM31/750 | MS31/750 | 461               | <b>710</b>      | 750 | 950                 | 622 | 112    | 137                 | Tr750X7         | G1/8           | 8                   | 12 |  |
| <b>H33/750-HG</b>                              | HM31/750 | MS31/750 | 574               | <b>710</b>      | 750 | 950                 | 688 | 112    | 137                 | Tr750X7         | G1/8           | 8                   | 12 |  |
| <b>H39/800-HG</b>                              | HM30/800 | MS30/750 | 263               | <b>750</b>      | 800 | 920                 | 303 | 90     | 111                 | Tr800X7         | G1/8           | 10                  | 12 |  |
| <b>H30/800-HG</b>                              | HM30/800 | MS30/750 | 305               | <b>750</b>      | 800 | 920                 | 366 | 90     | 111                 | Tr800X7         | G1/8           | 10                  | 12 |  |
| <b>H240/800-HG</b>                             | HM30/800 | MS30/750 | 349               | <b>750</b>      | 800 | 920                 | 475 | 90     | 111                 | Tr800X7         | G1/8           | 10                  | 12 |  |
| <b>H31/800-HG</b>                              | HM31/800 | MS31/750 | 515               | <b>750</b>      | 800 | 1000                | 505 | 112    | 137                 | Tr800X7         | G1/8           | 10                  | 12 |  |
| <b>H32/800-HG</b>                              | HM31/800 | MS31/750 | 611               | <b>750</b>      | 800 | 1000                | 618 | 112    | 137                 | Tr800X7         | G1/8           | 10                  | 12 |  |
| <b>H241/800-HG</b>                             | HM31/800 | MS31/750 | 552               | <b>750</b>      | 800 | 1000                | 627 | 112    | 137                 | Tr800X7         | G1/8           | 10                  | 12 |  |
| <b>H33/800-HG</b>                              | HM31/800 | MS31/750 | 716               | <b>750</b>      | 800 | 1000                | 730 | 112    | 137                 | Tr800X7         | G1/8           | 10                  | 12 |  |

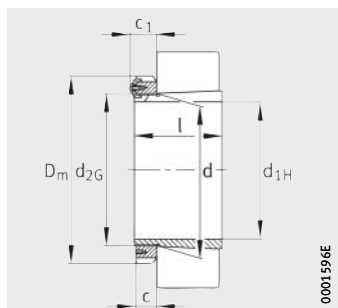
**Dimension table (continued) - Dimensions in mm**

| Designation                |           |           | Mass<br>m<br>≈kg | Dimensions      |      |                     |     |        |                     |                 |                | Mounting<br>dimensions |    |  |
|----------------------------|-----------|-----------|------------------|-----------------|------|---------------------|-----|--------|---------------------|-----------------|----------------|------------------------|----|--|
| Adapter sleeve<br>Complete | Nut       | Retainer  |                  | d <sub>1H</sub> | d    | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub> | e                      | t  |  |
| <b>H39/850-HG</b>          | HM30/850  | MS30/850  | 292              | <b>800</b>      | 850  | 980                 | 308 | 90     | 115                 | Tr850X7         | G1/8           | 10                     | 12 |  |
| <b>H30/850-HG</b>          | HM30/850  | MS30/850  | 344              | <b>800</b>      | 850  | 980                 | 380 | 90     | 115                 | Tr850X7         | G1/8           | 10                     | 12 |  |
| <b>H240/850-HG</b>         | HM30/850  | MS30/850  | 393              | <b>800</b>      | 850  | 980                 | 495 | 90     | 115                 | Tr850X7         | G1/8           | 10                     | 12 |  |
| <b>H31/850-HG</b>          | HM31/850  | MS31/850  | 590              | <b>800</b>      | 850  | 1060                | 536 | 118    | 143                 | Tr850X7         | G1/8           | 10                     | 12 |  |
| <b>H32/850-HG</b>          | HM31/850  | MS31/850  | 696              | <b>800</b>      | 850  | 1060                | 651 | 118    | 143                 | Tr850X7         | G1/8           | 10                     | 12 |  |
| <b>H241/850-HG</b>         | HM31/850  | MS31/850  | 624              | <b>800</b>      | 850  | 1060                | 658 | 118    | 143                 | Tr850X7         | G1/8           | 10                     | 12 |  |
| <b>H33/850-HG</b>          | HM31/850  | MS31/850  | 814              | <b>800</b>      | 850  | 1060                | 766 | 118    | 143                 | Tr850X7         | G1/8           | 10                     | 12 |  |
| <b>H39/900-HG</b>          | HM30/900  | MS30/850  | 335              | <b>850</b>      | 900  | 1030                | 326 | 100    | 122                 | Tr900X7         | G1/8           | 10                     | 12 |  |
| <b>H240/900-HG</b>         | HM30/900  | MS30/850  | 364              | <b>850</b>      | 900  | 1030                | 410 | 100    | 122                 | Tr900X7         | G1/8           | 10                     | 12 |  |
| <b>H30/900-HG</b>          | HM30/900  | MS30/850  | 392              | <b>850</b>      | 900  | 1030                | 400 | 100    | 122                 | Tr900X7         | G1/8           | 10                     | 12 |  |
| <b>H240/900-HG</b>         | HM30/900  | MS30/850  | 446              | <b>850</b>      | 900  | 1030                | 520 | 100    | 122                 | Tr900X7         | G1/8           | 10                     | 12 |  |
| <b>H31/900-HG</b>          | HM31/900  | MS31/900  | 674              | <b>850</b>      | 900  | 1120                | 557 | 125    | 150                 | Tr900X7         | G1/8           | 10                     | 12 |  |
| <b>H32/900-HG</b>          | HM31/900  | MS31/900  | 775              | <b>850</b>      | 900  | 1120                | 660 | 125    | 150                 | Tr900X7         | G1/8           | 10                     | 12 |  |
| <b>H241/900-HG</b>         | HM31/900  | MS31/900  | 712              | <b>850</b>      | 900  | 1120                | 685 | 125    | 150                 | Tr900X7         | G1/8           | 10                     | 12 |  |
| <b>H33/900-HG</b>          | HM31/900  | MS31/900  | 923              | <b>850</b>      | 900  | 1120                | 795 | 125    | 150                 | Tr900X7         | G1/8           | 10                     | 12 |  |
| <b>H39/950-HG</b>          | HM30/950  | MS30/950  | 369              | <b>900</b>      | 950  | 1080                | 344 | 100    | 122                 | Tr950X8         | G1/8           | 10                     | 12 |  |
| <b>H30/950-HG</b>          | HM30/950  | MS30/950  | 432              | <b>900</b>      | 950  | 1080                | 420 | 100    | 122                 | Tr950X8         | G1/8           | 10                     | 12 |  |
| <b>H240/950-HG</b>         | HM30/950  | MS30/950  | 499              | <b>900</b>      | 950  | 1080                | 557 | 100    | 122                 | Tr950X8         | G1/8           | 10                     | 12 |  |
| <b>H31/950-HG</b>          | HM31/950  | MS31/950  | 738              | <b>900</b>      | 950  | 1170                | 583 | 125    | 150                 | Tr950X8         | G1/8           | 10                     | 12 |  |
| <b>H32/950-HG</b>          | HM31/950  | MS31/950  | 835              | <b>900</b>      | 950  | 1170                | 675 | 125    | 150                 | Tr950X8         | G1/8           | 10                     | 12 |  |
| <b>H241/950-HG</b>         | HM31/950  | MS31/950  | 776              | <b>900</b>      | 950  | 1170                | 715 | 125    | 150                 | Tr950X8         | G1/8           | 10                     | 12 |  |
| <b>H33/950-HG</b>          | HM31/950  | MS31/950  | 1000             | <b>900</b>      | 950  | 1170                | 815 | 125    | 150                 | Tr950X8         | G1/8           | 10                     | 12 |  |
| <b>H39/1000-HG</b>         | HM30/1000 | MS30/1000 | 410              | <b>950</b>      | 1000 | 1140                | 358 | 100    | 122                 | Tr1000X8        | G1/8           | 10                     | 12 |  |
| <b>H30/1000-HG</b>         | HM30/1000 | MS30/1000 | 474              | <b>950</b>      | 1000 | 1140                | 430 | 100    | 122                 | Tr1000X8        | G1/8           | 10                     | 12 |  |
| <b>H240/1000-HG</b>        | HM30/1000 | MS30/1000 | 539              | <b>950</b>      | 1000 | 1140                | 562 | 100    | 122                 | Tr1000X8        | G1/8           | 10                     | 12 |  |
| <b>H31/1000-HG</b>         | HM31/1000 | MS31/1000 | 840              | <b>950</b>      | 1000 | 1240                | 609 | 125    | 150                 | Tr1000X8        | G1/8           | 10                     | 12 |  |
| <b>H32/1000-HG</b>         | HM31/1000 | MS31/1000 | 952              | <b>950</b>      | 1000 | 1240                | 707 | 125    | 150                 | Tr1000X8        | G1/8           | 10                     | 12 |  |
| <b>H241/1000-HG</b>        | HM31/1000 | MS31/1000 | 886              | <b>950</b>      | 1000 | 1240                | 755 | 125    | 150                 | Tr1000X8        | G1/8           | 10                     | 12 |  |
| <b>H33/1000-HG</b>         | HM31/1000 | MS31/1000 | 1140             | <b>950</b>      | 1000 | 1240                | 857 | 125    | 150                 | Tr1000X8        | G1/8           | 10                     | 12 |  |

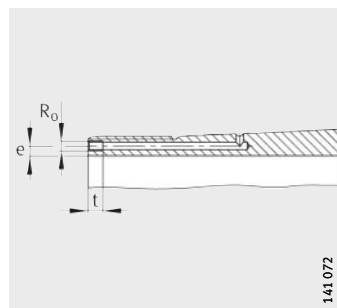


# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241,  
H248, H249)



Hydraulic adapter sleeve  
(suffix HG)  
Mounting dimensions

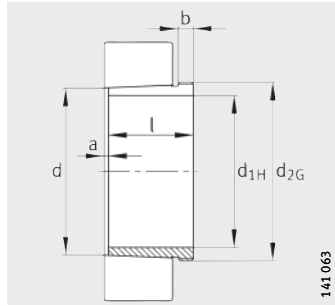
| Dimension table (continued) · Dimensions in mm |            |           |                  |                 |       |                     |     |        |                     |                 |                     |    |    |
|--|------------|-----------|------------------|-----------------|-------|---------------------|-----|--------|---------------------|-----------------|---------------------|----|----|
| Designation                                    |            |           | Mass<br>m<br>≈kg | Dimensions      |       |                     |     |        |                     |                 | Mounting dimensions |    |    |
| Adapter sleeve Complete                        | Nut        | Retainer  |                  | d <sub>1H</sub> | d     | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub>      | e  | t  |
| <b>H39/1060-HG</b>                             | HM30/1060  | MS30/1000 | 493              | <b>1 000</b>    | 1 060 | 1 200               | 372 | 100    | 122                 | Tr1060X8        | G1/4                | 12 | 15 |
| <b>H30/1060-HG</b>                             | HM30/1060  | MS30/1000 | 574              | <b>1 000</b>    | 1 060 | 1 200               | 447 | 100    | 122                 | Tr1060X8        | G1/4                | 12 | 15 |
| <b>H240/1060-HG</b>                            | HM30/1060  | MS30/1000 | 665              | <b>1 000</b>    | 1 060 | 1 200               | 588 | 100    | 122                 | Tr1060X8        | G1/4                | 12 | 15 |
| <b>H31/1060-HG</b>                             | HM31/1060  | MS31/1000 | 985              | <b>1 000</b>    | 1 060 | 1 300               | 622 | 125    | 150                 | Tr1060X8        | G1/4                | 12 | 15 |
| <b>H241/1060-HG</b>                            | HM31/1060  | MS31/1000 | 1 060            | <b>1 000</b>    | 1 060 | 1 300               | 775 | 125    | 150                 | Tr1060X8        | G1/4                | 12 | 15 |
| <b>H248/1060-HG</b>                            | Z-195070.0 | MS30/560  | 263              | <b>1 020</b>    | 1 060 | 1 150               | 335 | 80     | 101                 | Tr1060X8        | G1/8                | 9  | 12 |
| <b>H39/1120-HG</b>                             | HM30/1120  | MS30/1000 | 521              | <b>1 060</b>    | 1 120 | 1 260               | 372 | 100    | 122                 | Tr1120X8        | G1/4                | 12 | 15 |
| <b>H30/1120-HG</b>                             | HM30/1120  | MS30/1000 | 631              | <b>1 060</b>    | 1 120 | 1 260               | 467 | 100    | 122                 | Tr1120X8        | G1/4                | 12 | 15 |
| <b>H240/1120-HG</b>                            | HM30/1120  | MS30/1000 | 728              | <b>1 060</b>    | 1 120 | 1 260               | 612 | 100    | 122                 | Tr1120X8        | G1/4                | 12 | 15 |
| <b>H31/1120-HG</b>                             | HM31/1120  | MS31/1000 | 1 060            | <b>1 060</b>    | 1 120 | 1 360               | 622 | 125    | 150                 | Tr1120X8        | G1/4                | 12 | 15 |
| <b>H241/1120-HG</b>                            | HM31/1120  | MS31/1000 | 1 170            | <b>1 060</b>    | 1 120 | 1 360               | 805 | 125    | 150                 | Tr1120X8        | G1/4                | 13 | 15 |
| <b>H39/1180-HG</b>                             | HM30/1180  | MS30/1000 | 576              | <b>1 120</b>    | 1 180 | 1 320               | 394 | 100    | 122                 | Tr1180X8        | G1/4                | 12 | 15 |
| <b>H30/1180-HG</b>                             | HM30/1180  | MS30/1000 | 682              | <b>1 120</b>    | 1 180 | 1 320               | 479 | 100    | 122                 | Tr1180X8        | G1/4                | 12 | 15 |
| <b>H240/1180-HG</b>                            | HM30/1180  | MS30/1000 | 782              | <b>1 120</b>    | 1 180 | 1 320               | 625 | 100    | 122                 | Tr1180X8        | G1/4                | 12 | 15 |
| <b>H31/1180-HG</b>                             | HM31/1180  | MS31/1000 | 1 160            | <b>1 120</b>    | 1 180 | 1 420               | 647 | 125    | 150                 | Tr1180X8        | G1/4                | 12 | 15 |
| <b>H241/1180-HG</b>                            | HM31/1180  | MS31/1000 | 1 290            | <b>1 120</b>    | 1 180 | 1 420               | 845 | 125    | 150                 | Tr1180X8        | G1/4                | 13 | 15 |
| <b>H39/1250-HG</b>                             | HM30/1250  | MS30/1000 | 708              | <b>1 180</b>    | 1 250 | 1 390               | 407 | 110    | 132                 | Tr1250X8        | G1/4                | 14 | 15 |
| <b>H30/1250-HG</b>                             | HM30/1250  | MS30/1000 | 858              | <b>1 180</b>    | 1 250 | 1 390               | 509 | 110    | 132                 | Tr1250X8        | G1/4                | 15 | 15 |
| <b>H240/1250-HG</b>                            | HM30/1250  | MS30/1000 | 988              | <b>1 180</b>    | 1 250 | 1 390               | 660 | 110    | 132                 | Tr1250X8        | G1/4                | 14 | 15 |
| <b>H31/1250-HG</b>                             | HM31/1250  | MS31/1000 | 1 380            | <b>1 180</b>    | 1 250 | 1 490               | 677 | 125    | 150                 | Tr1250X8        | G1/4                | 14 | 15 |
| <b>H241/1250-HG</b>                            | HM31/1250  | MS31/1000 | 1 540            | <b>1 180</b>    | 1 250 | 1 490               | 885 | 125    | 150                 | Tr1250X8        | G1/4                | 14 | 15 |
| <b>H39/1320-HG</b>                             | HM30/1320  | MS30/1000 | 781              | <b>1 250</b>    | 1 320 | 1 460               | 430 | 110    | 132                 | Tr1320X8        | G1/4                | 14 | 15 |
| <b>H30/1320-HG</b>                             | HM30/1320  | MS30/1000 | 946              | <b>1 250</b>    | 1 320 | 1 460               | 534 | 110    | 132                 | Tr1320X8        | G1/4                | 15 | 15 |
| <b>H240/1320-HG</b>                            | HM30/1320  | MS30/1000 | 1 080            | <b>1 250</b>    | 1 320 | 1 460               | 690 | 110    | 132                 | Tr1320X8        | G1/4                | 14 | 15 |
| <b>H31/1320-HG</b>                             | HM31/1320  | MS31/1000 | 1 510            | <b>1 250</b>    | 1 320 | 1 560               | 710 | 125    | 150                 | Tr1320X8        | G1/4                | 14 | 15 |
| <b>H241/1320-HG</b>                            | HM31/1320  | MS31/1000 | 1 700            | <b>1 250</b>    | 1 320 | 1 560               | 935 | 125    | 150                 | Tr1320X8        | G1/4                | 14 | 15 |
| <b>H39/1400-HG</b>                             | HM30/1400  | MS30/1000 | 924              | <b>1 320</b>    | 1 400 | 1 540               | 445 | 110    | 132                 | Tr1400X8        | G1/4                | 15 | 15 |
| <b>H30/1400-HG</b>                             | HM30/1400  | MS30/1000 | 1 110            | <b>1 320</b>    | 1 400 | 1 540               | 546 | 110    | 132                 | Tr1400X8        | G1/4                | 15 | 15 |
| <b>H240/1400-HG</b>                            | HM30/1400  | MS30/1000 | 1 290            | <b>1 320</b>    | 1 400 | 1 540               | 705 | 110    | 132                 | Tr1400X8        | G1/4                | 14 | 15 |
| <b>H31/1400-HG</b>                             | HM31/1400  | MS31/1000 | 1 790            | <b>1 320</b>    | 1 400 | 1 640               | 735 | 130    | 155                 | Tr1400X8        | G1/4                | 15 | 15 |
| <b>H241/1400-HG</b>                            | HM31/1400  | MS31/1000 | 2 030            | <b>1 320</b>    | 1 400 | 1 640               | 965 | 130    | 155                 | Tr1400X8        | G1/4                | 15 | 15 |

**Dimension table** (continued) - Dimensions in mm

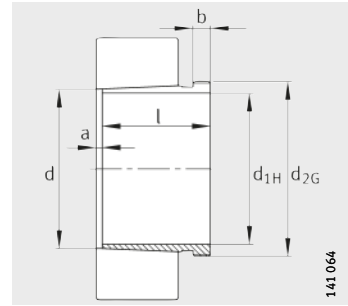
| Designation                |                |           | Mass<br>m<br>≈kg | Dimensions      |       |                     |     |        |                     |                 | Mounting<br>dimensions |    |    |
|----------------------------|----------------|-----------|------------------|-----------------|-------|---------------------|-----|--------|---------------------|-----------------|------------------------|----|----|
| Adapter sleeve<br>Complete | Nut            | Retainer  |                  | d <sub>1H</sub> | d     | D <sub>m</sub><br>≈ | l   | c<br>≈ | c <sub>1</sub><br>≈ | d <sub>2G</sub> | R <sub>0</sub>         | e  | t  |
| <b>H39/1500-HG</b>         | HM30/1500      | MS30/1500 | 1 210            | <b>1 400</b>    | 1 500 | 1 650               | 465 | 110    | 132                 | Tr1500X8        | G1/4                   | 15 | 15 |
| <b>H30/1500-HG</b>         | HM30/1500      | MS30/1500 | 1 530            | <b>1 400</b>    | 1 500 | 1 650               | 600 | 110    | 132                 | Tr1500X8        | G1/4                   | 15 | 15 |
| <b>H240/1500-HG</b>        | HM30/1500      | MS30/1500 | 1 790            | <b>1 400</b>    | 1 500 | 1 650               | 775 | 110    | 132                 | Tr1500X8        | G1/4                   | 14 | 15 |
| <b>H31/1500-HG</b>         | HM31/1500      | MS31/1000 | 2 230            | <b>1 400</b>    | 1 500 | 1 740               | 755 | 130    | 155                 | Tr1500X8        | G1/4                   | 15 | 15 |
| <b>H241/1500-HG</b>        | HM31/1500      | MS31/1000 | 2 560            | <b>1 400</b>    | 1 500 | 1 740               | 990 | 130    | 155                 | Tr1500X8        | G1/4                   | 15 | 15 |
| <b>H39/1600-HG</b>         | Z-195077.01.HM | MS30/850  | 2 480            | <b>1 500</b>    | 1 600 | 1 730               | 465 | 100    | 122                 | Tr1600X8        | G1/4                   | 15 | 15 |
| <b>H39/1700-HG</b>         | Z-195078.01.HM | MS30/850  | 2 620            | <b>1 600</b>    | 1 700 | 1 830               | 475 | 100    | 122                 | Tr1600X8        | G1/4                   | 15 | 15 |



# Withdrawal sleeves



Taper 1:12

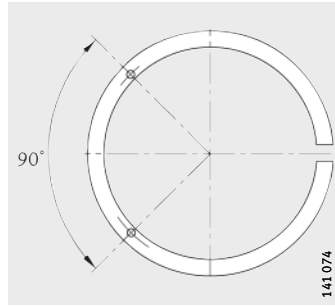
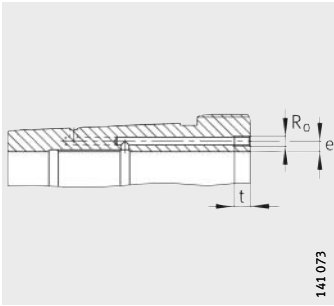


AH240, AH241  
Taper 1:30

**Dimension table** - Dimensions in mm

| Designation | Mass<br>m<br>≈ kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |   |
|-------------|-------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|---|
|             |                   | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t |
| AHX2330     | 2,88              | 145             | 150 | 135 | 5      | 24 | M165X3          | -                   | -   | - |
| AHX2330G    | 2,64              | 145             | 150 | 135 | 5      | 24 | M160X3          | -                   | -   | - |
| AH3330      | 3,36              | 145             | 150 | 152 | 5      | 24 | M165X3          | -                   | -   | - |
| AH2332      | 4,77              | 150             | 160 | 140 | 6      | 24 | M180X3          | -                   | -   | - |
| AH2332G     | 4,26              | 150             | 160 | 140 | 6      | 24 | M170X3          | -                   | -   | - |
| AH2332G-H   | 4,26              | 150             | 160 | 140 | 6      | 24 | M170X3          | M6                  | 4,5 | 7 |
| AH2332-H    | 4,77              | 150             | 160 | 140 | 6      | 24 | M180X3          | M6                  | 4,5 | 7 |
| AH3332      | 5,58              | 150             | 160 | 160 | 6      | 24 | M180X3          | -                   | -   | - |
| AH3332-H    | 5,58              | 150             | 160 | 160 | 6      | 24 | M180X3          | M6                  | 4,5 | 7 |
| AH2334      | 5,32              | 160             | 170 | 146 | 6      | 24 | M190X3          | -                   | -   | - |
| AH2334G     | 4,78              | 160             | 170 | 146 | 6      | 24 | M180X3          | -                   | -   | - |
| AH2334G-H   | 4,78              | 160             | 170 | 146 | 6      | 24 | M180X3          | M6                  | 4,5 | 7 |
| AH2334-H    | 5,32              | 160             | 170 | 146 | 6      | 24 | M190X3          | M6                  | 4,5 | 7 |
| AH3334      | 6,11              | 160             | 170 | 164 | 6      | 24 | M190X3          | -                   | -   | - |
| AH3334-H    | 6,11              | 160             | 170 | 164 | 6      | 24 | M190X3          | M6                  | 4,5 | 7 |
| AH2236      | 3,76              | 170             | 180 | 105 | 5      | 17 | M200X3          | -                   | -   | - |
| AH2236G     | 3,35              | 170             | 180 | 105 | 5      | 17 | M190X3          | -                   | -   | - |
| AH2236G-H   | 3,28              | 170             | 180 | 105 | 5      | 17 | M190X3          | M6                  | 4,5 | 7 |
| AH2236-H    | 3,68              | 170             | 180 | 105 | 5      | 17 | M200X3          | M6                  | 4,5 | 7 |
| AH3236      | 5,39              | 170             | 180 | 140 | 6      | 25 | M200X3          | -                   | -   | - |
| AH3236G     | 4,8               | 170             | 180 | 140 | 6      | 25 | M190X3          | -                   | -   | - |
| AH3236G-H   | 4,8               | 170             | 180 | 140 | 6      | 25 | M190X3          | M6                  | 4,5 | 7 |
| AH3236-H    | 5,39              | 170             | 180 | 140 | 6      | 25 | M200X3          | M6                  | 4,5 | 7 |
| AH2336      | 6,04              | 170             | 180 | 154 | 6      | 26 | M200X3          | -                   | -   | - |
| AH2336G     | 5,42              | 170             | 180 | 154 | 6      | 26 | M190X3          | -                   | -   | - |
| AH2336G-H   | 5,42              | 170             | 180 | 154 | 6      | 26 | M190X3          | M6                  | 4,5 | 7 |
| AH2336-H    | 6,04              | 170             | 180 | 154 | 6      | 26 | M200X3          | M6                  | 4,5 | 7 |
| AH3336      | 7,1               | 170             | 180 | 176 | 6      | 26 | M200X3          | -                   | -   | - |
| AH3336-H    | 7,1               | 170             | 180 | 176 | 6      | 26 | M200X3          | M6                  | 4,5 | 7 |





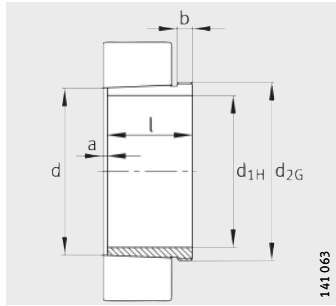
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors  
for hydraulic withdrawal sleeve

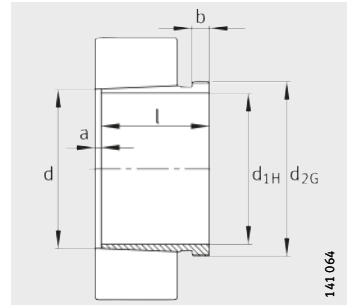
**Dimension table** (continued) - Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |   |
|-------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|---|
|             |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t |
| AH2238      | 4,28             | 180             | 190 | 112 | 5      | 18 | Tr210X4         | -                   | -   | - |
| AH2238G     | 3,83             | 180             | 190 | 112 | 5      | 18 | M200X3          | -                   | -   | - |
| AH2238G-H   | 3,75             | 180             | 190 | 112 | 5      | 18 | M200X3          | M6                  | 4,5 | 7 |
| AH2238-H    | 4,19             | 180             | 190 | 112 | 5      | 18 | Tr210X4         | M6                  | 4,5 | 7 |
| AH3138      | 4,89             | 180             | 190 | 125 | 6      | 20 | Tr210X4         | -                   | -   | - |
| AH3138G     | 4,39             | 180             | 190 | 125 | 6      | 20 | M200X3          | -                   | -   | - |
| AH3138G-H   | 4,39             | 180             | 190 | 125 | 6      | 20 | M200X3          | M6                  | 4,5 | 7 |
| AH3138-H    | 4,89             | 180             | 190 | 125 | 6      | 20 | Tr210X4         | M6                  | 4,5 | 7 |
| AH3238      | 5,92             | 180             | 190 | 145 | 7      | 25 | Tr210X4         | -                   | -   | - |
| AH3238G     | 5,3              | 180             | 190 | 145 | 7      | 25 | M200X3          | -                   | -   | - |
| AH3238G-H   | 5,3              | 180             | 190 | 145 | 7      | 25 | M200X3          | M6                  | 4,5 | 7 |
| AH3238-H    | 5,92             | 180             | 190 | 145 | 7      | 25 | Tr210X4         | M6                  | 4,5 | 7 |
| AH24138     | 4,37             | 180             | 190 | 146 | 13     | 18 | M200X3          | -                   | -   | - |
| AH2338      | 6,67             | 180             | 190 | 160 | 7      | 26 | Tr210X4         | -                   | -   | - |
| AH2338G     | 6,02             | 180             | 190 | 160 | 7      | 26 | M200X3          | -                   | -   | - |
| AH2338G-H   | 6,02             | 180             | 190 | 160 | 7      | 26 | M200X3          | M6                  | 4,5 | 7 |
| AH2338-H    | 6,67             | 180             | 190 | 160 | 7      | 26 | Tr210X4         | M6                  | 4,5 | 7 |
| AH3338      | 7,76             | 180             | 190 | 181 | 7      | 26 | Tr210X4         | -                   | -   | - |
| AH3338-H    | 7,76             | 180             | 190 | 181 | 7      | 26 | Tr210X4         | M6                  | 4,5 | 7 |
| AH2240      | 4,8              | 190             | 200 | 118 | 5      | 19 | Tr220X4         | -                   | -   | - |
| AH2240-H    | 4,7              | 190             | 200 | 118 | 5      | 19 | Tr220X4         | M6                  | 4,5 | 7 |
| AH3140      | 5,6              | 190             | 200 | 134 | 6      | 21 | Tr220X4         | -                   | -   | - |
| AH3140-H    | 5,6              | 190             | 200 | 134 | 6      | 21 | Tr220X4         | M6                  | 4,5 | 7 |
| AH3240      | 6,61             | 190             | 200 | 153 | 7      | 24 | Tr220X4         | -                   | -   | - |
| AH3240-H    | 6,61             | 190             | 200 | 153 | 7      | 24 | Tr220X4         | M6                  | 4,5 | 7 |
| AH24140     | 5,02             | 190             | 200 | 158 | 13     | 18 | Tr220X4         | -                   | -   | - |
| AH2340      | 7,64             | 190             | 200 | 170 | 7      | 30 | Tr220X4         | -                   | -   | - |
| AH2340-H    | 7,64             | 190             | 200 | 170 | 7      | 30 | Tr220X4         | M6                  | 4,5 | 7 |
| AH3340      | 9,04             | 190             | 200 | 195 | 7      | 30 | Tr220X4         | -                   | -   | - |
| AH3340-H    | 9,04             | 190             | 200 | 195 | 7      | 30 | Tr220X4         | M6                  | 4,5 | 7 |

# Withdrawal sleeves



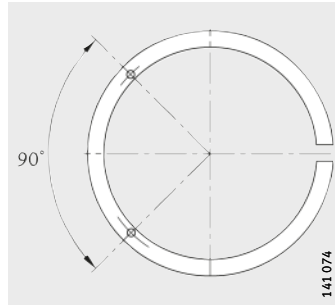
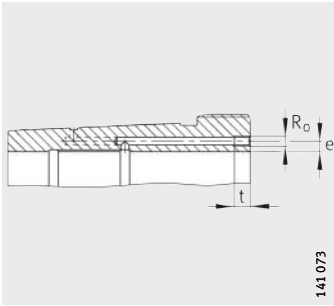
Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|-------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|             |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH3044      | 7,47             | 200             | 220 | 111 | 6      | 20 | Tr235X4         | –                   | –   | –  |
| AH3044G     | 7,18             | 200             | 220 | 111 | 6      | 20 | Tr230X4         | –                   | –   | –  |
| AH3044G-H   | 7,18             | 200             | 220 | 111 | 6      | 20 | Tr230X4         | G1/8                | 6,5 | 12 |
| AH3044-H    | 7,47             | 200             | 220 | 111 | 6      | 20 | Tr235X4         | G1/8                | 8,5 | 12 |
| AH2244      | 9,17             | 200             | 220 | 130 | 6      | 20 | Tr240X4         | –                   | –   | –  |
| AH2244-H    | 8,99             | 200             | 220 | 130 | 6      | 20 | Tr240X4         | G1/8                | 8,5 | 12 |
| AH24044     | 8,22             | 200             | 220 | 138 | 14     | 18 | Tr230X4         | –                   | –   | –  |
| AH24044-H   | 8,22             | 200             | 220 | 138 | 14     | 18 | Tr230X4         | M6                  | 8   | 7  |
| AH3144      | 10,4             | 200             | 220 | 145 | 6      | 23 | Tr240X4         | G1/8                | 8,5 | 12 |
| AH3144-H    | 10,4             | 200             | 220 | 145 | 6      | 23 | Tr240X4         | G1/8                | 8,5 | 12 |
| AH24144     | 10,3             | 200             | 220 | 170 | 14     | 20 | Tr230X4         | –                   | –   | –  |
| AH24144-H   | 10,3             | 200             | 220 | 170 | 14     | 20 | Tr230X4         | M6                  | 8   | 7  |
| AH2344      | 13,6             | 200             | 220 | 181 | 8      | 30 | Tr240X4         | –                   | –   | –  |
| AH2344-H    | 13,6             | 200             | 220 | 181 | 8      | 30 | Tr240X4         | G1/8                | 8,5 | 12 |
| AH3344      | 16,2             | 200             | 220 | 210 | 8      | 30 | Tr240X4         | –                   | –   | –  |
| AH3344-H    | 16,2             | 200             | 220 | 210 | 8      | 30 | Tr240X4         | G1/8                | 8,5 | 12 |
| AH3948      | 5,26             | 220             | 240 | 77  | 6      | 16 | Tr250X4         | –                   | –   | –  |
| AH3948-H    | 5,26             | 220             | 240 | 77  | 6      | 16 | Tr250X4         | M6                  | 7,5 | 12 |
| AH3048      | 8,92             | 220             | 240 | 116 | 7      | 21 | Tr260X4         | –                   | –   | –  |
| AH3048-H    | 8,92             | 220             | 240 | 116 | 7      | 21 | Tr260X4         | G1/8                | 8,5 | 12 |
| AH24048     | 9,03             | 220             | 240 | 138 | 15     | 20 | Tr250X4         | –                   | –   | –  |
| AH24048-H   | 9,03             | 220             | 240 | 138 | 15     | 20 | Tr250X4         | M6                  | 8   | 7  |
| AH2248      | 11,3             | 220             | 240 | 144 | 6      | 21 | Tr260X4         | –                   | –   | –  |
| AH2248-H    | 11               | 220             | 240 | 144 | 6      | 21 | Tr260X4         | G1/8                | 8,5 | 12 |
| AH3148      | 12,3             | 220             | 240 | 154 | 7      | 25 | Tr260X4         | –                   | –   | –  |
| AH3148-H    | 12,3             | 220             | 240 | 154 | 7      | 25 | Tr260X4         | G1/8                | 8,5 | 12 |
| AH24148     | 12,6             | 220             | 240 | 180 | 15     | 20 | Tr260X4         | –                   | –   | –  |
| AH24148-H   | 12,6             | 220             | 240 | 180 | 15     | 20 | Tr260X4         | G1/8                | 8,5 | 12 |
| AH2348      | 15,6             | 220             | 240 | 189 | 8      | 30 | Tr260X4         | –                   | –   | –  |
| AH2348-H    | 15,6             | 220             | 240 | 189 | 8      | 30 | Tr260X4         | G1/8                | 8,5 | 12 |
| AH3348      | 19,3             | 220             | 240 | 225 | 8      | 30 | Tr260X4         | –                   | –   | –  |
| AH3348-H    | 19,3             | 220             | 240 | 225 | 8      | 30 | Tr260X4         | G1/8                | 8,5 | 12 |



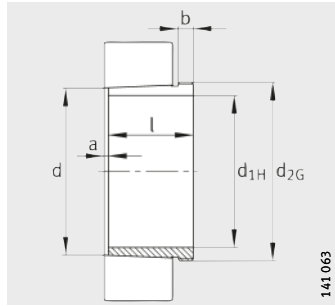
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors  
for hydraulic withdrawal sleeve

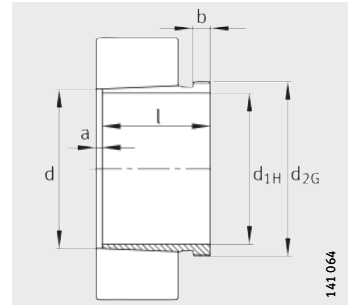
**Dimension table** (continued) - Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|-------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|             |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH3952      | 7,39             | 240             | 260 | 94  | 6      | 18 | Tr275X4         | -                   | -   | -  |
| AH3952G     | 7,7              | 240             | 260 | 94  | 6      | 18 | Tr280X4         | -                   | -   | -  |
| AH3952G-H   | 7,7              | 240             | 260 | 94  | 6      | 18 | Tr280X4         | M8                  | 7,5 | 12 |
| AH3952-H    | 7,39             | 240             | 260 | 94  | 6      | 18 | Tr275X4         | M8                  | 7,5 | 12 |
| AH3052      | 10,8             | 240             | 260 | 128 | 7      | 23 | Tr280X4         | -                   | -   | -  |
| AH3052-H    | 10,8             | 240             | 260 | 128 | 7      | 23 | Tr280X4         | G1/8                | 8,5 | 12 |
| AH2252      | 14,1             | 240             | 260 | 155 | 6      | 23 | Tr290X4         | -                   | -   | -  |
| AH2252G     | 13,3             | 240             | 260 | 155 | 6      | 23 | Tr280X4         | -                   | -   | -  |
| AH2252G-H   | 13,1             | 240             | 260 | 155 | 6      | 23 | Tr280X4         | G1/8                | 8,5 | 12 |
| AH2252-H    | 13,8             | 240             | 260 | 155 | 6      | 23 | Tr290X4         | G1/8                | 8,5 | 12 |
| AH24052     | 11,6             | 240             | 260 | 162 | 16     | 20 | Tr270X4         | -                   | -   | -  |
| AH24052G    | 12,3             | 240             | 260 | 162 | 16     | 20 | Tr280X4         | -                   | -   | -  |
| AH24052G-H  | 12,3             | 240             | 260 | 162 | 16     | 20 | Tr280X4         | M6                  | 8   | 7  |
| AH24052-H   | 11,6             | 240             | 260 | 162 | 16     | 20 | Tr270X4         | M6                  | 8   | 7  |
| AH3152      | 16               | 240             | 260 | 172 | 7      | 26 | Tr290X4         | -                   | -   | -  |
| AH3152G     | 15,1             | 240             | 260 | 172 | 7      | 26 | Tr280X4         | -                   | -   | -  |
| AH3152G-H   | 15,1             | 240             | 260 | 172 | 7      | 26 | Tr280X4         | G1/8                | 7   | 12 |
| AH3152-H    | 16               | 240             | 260 | 172 | 7      | 26 | Tr290X4         | G1/8                | 7   | 12 |
| AH24152     | 15,5             | 240             | 260 | 202 | 16     | 22 | Tr280X4         | -                   | -   | -  |
| AH24152-H   | 15,5             | 240             | 260 | 202 | 16     | 22 | Tr280X4         | G1/8                | 8,5 | 12 |
| AH2352      | 19,7             | 240             | 260 | 205 | 8      | 30 | Tr290X4         | -                   | -   | -  |
| AH2352G     | 18,7             | 240             | 260 | 205 | 8      | 30 | Tr280X4         | -                   | -   | -  |
| AH2352G-H   | 18,7             | 240             | 260 | 205 | 8      | 30 | Tr280X4         | G1/8                | 8,5 | 12 |
| AH2352-H    | 19,7             | 240             | 260 | 205 | 8      | 30 | Tr280X4         | G1/8                | 8,5 | 12 |
| AH3352      | 23,2             | 240             | 260 | 236 | 8      | 30 | Tr290X4         | -                   | -   | -  |
| AH3352-H    | 23,2             | 240             | 260 | 236 | 8      | 30 | Tr290X4         | G1/8                | 8,5 | 12 |

# Withdrawal sleeves



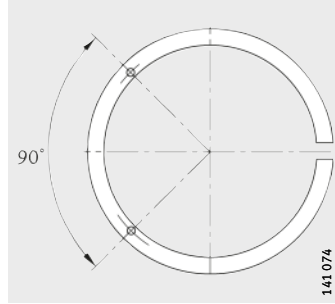
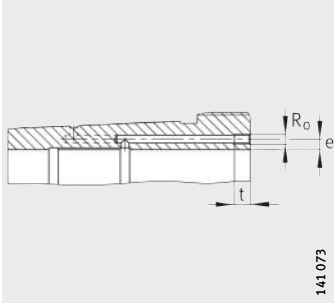
Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

| Designation | Mass<br>m<br>≈ kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|-------------|-------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|             |                   | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH3956      | 7,98              | 260             | 280 | 94  | 6      | 18 | Tr295X4         | –                   | –   | –  |
| AH3956G     | 8,3               | 260             | 280 | 94  | 6      | 18 | Tr300X4         | –                   | –   | –  |
| AH3956G-H   | 8,3               | 260             | 280 | 94  | 6      | 18 | Tr300X4         | M8                  | 7,5 | 12 |
| AH3956-H    | 7,98              | 260             | 280 | 94  | 6      | 18 | Tr295X4         | M8                  | 7,5 | 12 |
| AH3056      | 12                | 260             | 280 | 131 | 8      | 24 | Tr300X4         | –                   | –   | –  |
| AH3056-H    | 12                | 260             | 280 | 131 | 8      | 24 | Tr300X4         | G1/8                | 8,5 | 12 |
| AH2256      | 15,3              | 260             | 280 | 155 | 8      | 24 | Tr310X4         | –                   | –   | –  |
| AH2256G     | 14,4              | 260             | 280 | 155 | 8      | 24 | Tr300X4         | –                   | –   | –  |
| AH2256G-H   | 14,1              | 260             | 280 | 155 | 8      | 24 | Tr300X4         | G1/8                | 8,5 | 12 |
| AH2256-H    | 15                | 260             | 280 | 155 | 8      | 24 | Tr310X4         | G1/8                | 8,5 | 12 |
| AH24056     | 12,6              | 260             | 280 | 162 | 17     | 22 | Tr290X4         | –                   | –   | –  |
| AH24056G    | 13,4              | 260             | 280 | 162 | 17     | 22 | Tr300X4         | –                   | –   | –  |
| AH24056G-H  | 13,4              | 260             | 280 | 162 | 17     | 22 | Tr300X4         | M6                  | 8   | 7  |
| AH24056-H   | 12,6              | 260             | 280 | 162 | 17     | 22 | Tr290X4         | M6                  | 8   | 7  |
| AH3156      | 17,7              | 260             | 280 | 175 | 8      | 28 | Tr310X4         | –                   | –   | –  |
| AH3156G     | 16,7              | 260             | 280 | 175 | 8      | 28 | Tr300X4         | –                   | –   | –  |
| AH3156G-H   | 16,7              | 260             | 280 | 175 | 8      | 28 | Tr300X4         | G1/8                | 8,5 | 12 |
| AH3156-H    | 17,7              | 260             | 280 | 175 | 8      | 28 | Tr310X4         | G1/8                | –   | 12 |
| AH24156     | 16,7              | 260             | 280 | 202 | 17     | 22 | Tr300X4         | –                   | –   | –  |
| AH24156-H   | 16,7              | 260             | 280 | 202 | 17     | 22 | Tr300X4         | G1/8                | 8,5 | 12 |
| AH2356      | 22,1              | 260             | 280 | 212 | 8      | 30 | Tr310X4         | –                   | –   | –  |
| AH2356G     | 20,9              | 260             | 280 | 212 | 8      | 30 | Tr300X4         | –                   | –   | –  |
| AH2356G-H   | 20,9              | 260             | 280 | 212 | 8      | 30 | Tr300X4         | G1/8                | 8,5 | 12 |
| AH2356-H    | 22,1              | 260             | 280 | 212 | 8      | 30 | Tr310X4         | G1/8                | 8,5 | 12 |
| AH3356      | 27,4              | 260             | 280 | 254 | 8      | 30 | Tr310X4         | –                   | –   | –  |
| AH3356-H    | 27,4              | 260             | 280 | 254 | 8      | 30 | Tr310X4         | G1/8                | 8,5 | 12 |



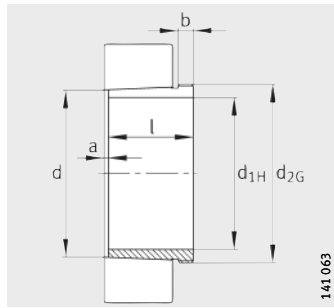
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors  
for hydraulic withdrawal sleeve

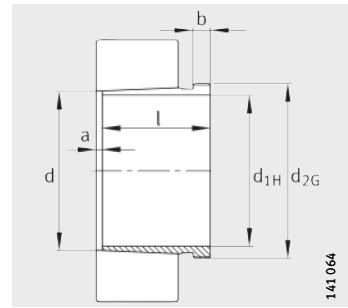
**Dimension table** (continued) - Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|-------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|             |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH3960      | 10,4             | 280             | 300 | 112 | 7      | 21 | Tr315X5         | -                   | -   | -  |
| AH3960G     | 10,8             | 280             | 300 | 112 | 7      | 21 | Tr320X5         | -                   | -   | -  |
| AH3960G-H   | 10,8             | 280             | 300 | 112 | 7      | 21 | Tr320X5         | M8                  | 7,5 | 12 |
| AH3960-H    | 10,4             | 280             | 300 | 112 | 7      | 21 | Tr315X5         | M8                  | 7,5 | 12 |
| AH3060      | 14,4             | 280             | 300 | 145 | 8      | 26 | Tr320X5         | -                   | -   | -  |
| AH3060-H    | 14,4             | 280             | 300 | 145 | 8      | 26 | Tr320X5         | G1/8                | 8,5 | 12 |
| AH2260      | 18,3             | 280             | 300 | 170 | 8      | 26 | Tr330X5         | -                   | -   | -  |
| AH2260G     | 17,2             | 280             | 300 | 170 | 8      | 26 | Tr320X5         | -                   | -   | -  |
| AH2260G-H   | 16,9             | 280             | 300 | 170 | 8      | 26 | Tr320X5         | G1/8                | 8,5 | 12 |
| AH2260-H    | 17,9             | 280             | 300 | 170 | 8      | 26 | Tr330X5         | G1/8                | 8,5 | 12 |
| AH24060     | 15,5             | 280             | 300 | 184 | 18     | 24 | Tr310X4         | -                   | -   | -  |
| AH24060G    | 16,4             | 280             | 300 | 184 | 18     | 24 | Tr320X5         | -                   | -   | -  |
| AH24060G-H  | 16,4             | 280             | 300 | 184 | 18     | 24 | Tr320X5         | M6                  | 8   | 7  |
| AH24060-H   | 15,5             | 280             | 300 | 184 | 18     | 24 | Tr310X4         | M6                  | 8   | 7  |
| AH3160      | 21,2             | 280             | 300 | 192 | 8      | 30 | Tr330X5         | -                   | -   | -  |
| AH3160G     | 20               | 280             | 300 | 192 | 8      | 30 | Tr320X5         | -                   | -   | -  |
| AH3160G-H   | 20               | 280             | 300 | 192 | 8      | 30 | Tr320X5         | G1/8                | 8,5 | 12 |
| AH3160-H    | 21,2             | 280             | 300 | 192 | 8      | 30 | Tr330X5         | G1/8                | 8,5 | 12 |
| AH24160     | 20,1             | 280             | 300 | 224 | 18     | 24 | Tr320X5         | -                   | -   | -  |
| AH24160-H   | 20,1             | 280             | 300 | 224 | 18     | 24 | Tr320X5         | G1/8                | 8,5 | 12 |
| AH3260      | 26               | 280             | 300 | 228 | 8      | 34 | Tr330X5         | -                   | -   | -  |
| AH3260G     | 24,6             | 280             | 300 | 228 | 8      | 34 | Tr320X5         | -                   | -   | -  |
| AH3260G-H   | 24,6             | 280             | 300 | 228 | 8      | 34 | Tr320X5         | G1/8                | 8,5 | 12 |
| AH3260-H    | 26               | 280             | 300 | 228 | 8      | 34 | Tr330X5         | G1/8                | 8,5 | 12 |
| AH3360      | 31,8             | 280             | 300 | 270 | 8      | 34 | Tr330X5         | -                   | -   | -  |
| AH3360-H    | 31,8             | 280             | 300 | 270 | 8      | 34 | Tr330X5         | G1/8                | 8,5 | 12 |

# Withdrawal sleeves



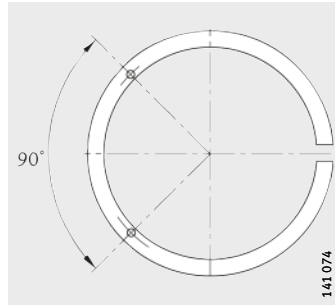
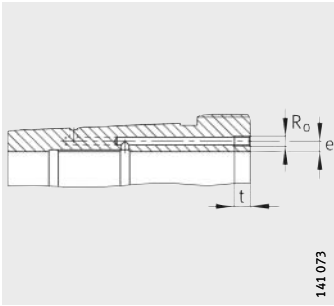
Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

| Designation | Mass<br>m<br>≈ kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|-------------|-------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|             |                   | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH3964G-H   | 11,5              | 300             | 320 | 112 | 7      | 21 | Tr340X5         | M8                  | 7,5 | 12 |
| AH3964-H    | 11,1              | 300             | 320 | 112 | 7      | 21 | Tr335X5         | M8                  | 7,5 | 12 |
| AH3064G-H   | 15,9              | 300             | 320 | 149 | 8      | 27 | Tr340X5         | G1/8                | 8,5 | 12 |
| AH3064-H    | 16,5              | 300             | 320 | 149 | 8      | 27 | Tr345X5         | G1/8                | 8,5 | 12 |
| AH2264G     | 19,8              | 300             | 320 | 180 | 10     | 27 | Tr340X5         | –                   | –   | –  |
| AH2264G-H   | 19,6              | 300             | 320 | 180 | 10     | 27 | Tr340X5         | G1/8                | 8,5 | 12 |
| AH2264-H    | 20,6              | 300             | 320 | 180 | 10     | 27 | Tr350X5         | G1/8                | 8,5 | 12 |
| AH24064G-H  | 17,5              | 300             | 320 | 184 | 18     | 24 | Tr340X5         | M6                  | 8   | 7  |
| AH24064-H   | 16,6              | 300             | 320 | 184 | 18     | 24 | Tr330X5         | M6                  | 8   | 7  |
| AH3164G-H   | 23,6              | 300             | 320 | 209 | 8      | 31 | Tr340X5         | G1/8                | 8,5 | 12 |
| AH3164-H    | 24,9              | 300             | 320 | 209 | 8      | 31 | Tr350X5         | G1/8                | 8,5 | 12 |
| AH24164-H   | 23,4              | 300             | 320 | 242 | 18     | 24 | Tr340X5         | G1/8                | 8,5 | 12 |
| AH3264G-H   | 28,9              | 300             | 320 | 246 | 8      | 36 | Tr340X5         | G1/8                | 8,5 | 12 |
| AH3264-H    | 30,4              | 300             | 320 | 246 | 8      | 36 | Tr350X5         | G1/8                | 8,5 | 12 |
| AH3364-H    | 37,9              | 300             | 320 | 294 | 8      | 36 | Tr350X5         | G1/8                | 8,5 | 12 |
| AH3968G-H   | 12,3              | 320             | 340 | 112 | 7      | 21 | Tr360X5         | M8                  | 7,5 | 12 |
| AH3968-H    | 11,8              | 320             | 340 | 112 | 7      | 21 | Tr355X5         | M8                  | 7,5 | 12 |
| AH3068G-H   | 18,6              | 320             | 340 | 162 | 9      | 28 | Tr360X5         | G1/8                | 8,5 | 12 |
| AH3068-H    | 19,2              | 320             | 340 | 162 | 9      | 28 | Tr365X5         | G1/8                | 8,5 | 12 |
| AH24068-H   | 21,1              | 320             | 340 | 206 | 19     | 26 | Tr360X5         | G1/8                | 8,5 | 12 |
| AH3168G-H   | 27,5              | 320             | 340 | 225 | 9      | 33 | Tr360X5         | G1/8                | 8,5 | 12 |
| AH3168-H    | 28,9              | 320             | 340 | 225 | 9      | 33 | Tr370X5         | G1/8                | 8,5 | 12 |
| AH3268G-H   | 33,6              | 320             | 340 | 264 | 9      | 38 | Tr360X5         | G1/8                | 8,5 | 12 |
| AH3268-H    | 35,3              | 320             | 340 | 264 | 9      | 38 | Tr370X5         | G1/8                | 8,5 | 12 |
| AH24168-H   | 28                | 320             | 340 | 269 | 19     | 26 | Tr360X5         | G1/8                | 8,5 | 12 |
| AH3368-H    | 43,1              | 320             | 340 | 310 | 9      | 38 | Tr370X5         | G1/8                | 8,5 | 12 |
| AH3972G-H   | 13                | 340             | 360 | 112 | 7      | 21 | Tr380X5         | M8                  | 7,5 | 12 |
| AH3972-H    | 12,5              | 340             | 360 | 112 | 7      | 21 | Tr375X5         | M8                  | 7,5 | 12 |
| AH3072G-H   | 20,5              | 340             | 360 | 167 | 9      | 30 | Tr380X5         | G1/8                | 8,5 | 12 |
| AH3072-H    | 21,2              | 340             | 360 | 167 | 9      | 30 | Tr385X5         | G1/8                | 8,5 | 12 |
| AH24072-H   | 22,3              | 340             | 360 | 206 | 20     | 26 | Tr380X5         | G1/8                | 8,5 | 12 |
| AH3172G-H   | 29,8              | 340             | 360 | 229 | 9      | 35 | Tr380X5         | G1/8                | 8,5 | 12 |
| AH3172-H    | 33,1              | 340             | 360 | 229 | 9      | 35 | Tr400X5         | G1/8                | 8,5 | 12 |
| AH24172-H   | 29,7              | 340             | 360 | 229 | 9      | 35 | Tr380X5         | G1/8                | 8,5 | 12 |
| AH3272G-H   | 37,3              | 340             | 360 | 274 | 9      | 40 | Tr380X5         | G1/8                | 8,5 | 12 |
| AH3272-H    | 41,1              | 340             | 360 | 274 | 9      | 40 | Tr400X5         | G1/8                | 8,5 | 12 |
| AH3372-H    | 51,5              | 340             | 360 | 330 | 9      | 40 | Tr400X5         | G1/8                | 8,5 | 12 |



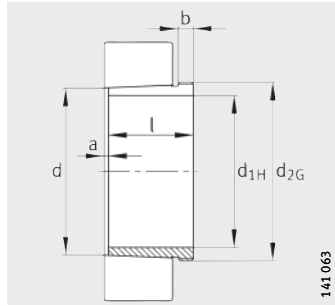
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors  
for hydraulic withdrawal sleeve

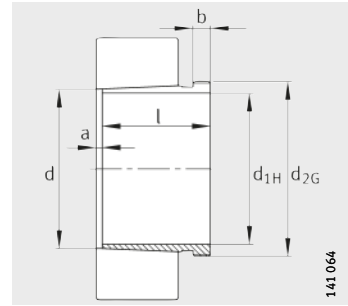
**Dimension table** (continued) - Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|-------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|             |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH3976G-H   | 16,1             | 360             | 380 | 130 | 8      | 22 | Tr400X5         | M8                  | 7,5 | 12 |
| AH3976-H    | 15,6             | 360             | 380 | 130 | 8      | 22 | Tr395X5         | M8                  | 7,5 | 12 |
| AH3076G-H   | 22,1             | 360             | 380 | 170 | 10     | 31 | Tr400X5         | G1/8                | 8,5 | 12 |
| AH3076-H    | 23,6             | 360             | 380 | 170 | 10     | 31 | Tr410X5         | G1/8                | 8,5 | 12 |
| AH24076-H   | 24               | 360             | 380 | 208 | 20     | 28 | Tr400X5         | G1/8                | 8,5 | 12 |
| AH3176G-H   | 32               | 360             | 380 | 232 | 10     | 36 | Tr400X5         | G1/8                | 8,5 | 12 |
| AH3176-H    | 35,6             | 360             | 380 | 232 | 10     | 36 | Tr420X5         | G1/8                | 8,5 | 12 |
| AH24176-H   | 31,8             | 360             | 380 | 271 | 20     | 28 | Tr400X5         | G1/8                | 8,5 | 12 |
| AH3276G-H   | 41,3             | 360             | 380 | 284 | 10     | 42 | Tr400X5         | G1/8                | 8,5 | 12 |
| AH3276-H    | 45,5             | 360             | 380 | 284 | 10     | 42 | Tr420X5         | G1/8                | 8,5 | 12 |
| AH3376-H    | 57,1             | 360             | 380 | 342 | 10     | 42 | Tr420X5         | G1/8                | 8,5 | 12 |
| AH3980G-H   | 17               | 380             | 400 | 130 | 8      | 22 | Tr420X5         | M8                  | 7,5 | 12 |
| AH3980-H    | 16,4             | 380             | 400 | 130 | 8      | 22 | Tr415X5         | M8                  | 7,5 | 12 |
| AH3080G-H   | 25,4             | 380             | 400 | 183 | 10     | 33 | Tr420X5         | G1/8                | 8,5 | 12 |
| AH3080-H    | 27,1             | 380             | 400 | 183 | 10     | 33 | Tr430X5         | G1/8                | 8,5 | 12 |
| AH24080-H   | 27,8             | 380             | 400 | 228 | 20     | 28 | Tr420X5         | G1/8                | 8,5 | 12 |
| AH3180G-H   | 35,1             | 380             | 400 | 240 | 10     | 38 | Tr420X5         | G1/8                | 8,5 | 12 |
| AH3180-H    | 39,1             | 380             | 400 | 240 | 10     | 38 | Tr440X5         | G1/8                | 8,5 | 12 |
| AH24180-H   | 34,4             | 380             | 400 | 278 | 20     | 28 | Tr420X5         | G1/8                | 8,5 | 12 |
| AH3280G-H   | 47,1             | 380             | 400 | 302 | 10     | 44 | Tr420X5         | G1/8                | 8,5 | 12 |
| AH3280-H    | 51,7             | 380             | 400 | 302 | 10     | 44 | Tr440X5         | G1/8                | 8,5 | 12 |
| AH3380-H    | 62,5             | 380             | 400 | 352 | 10     | 44 | Tr440X5         | G1/8                | 8,5 | 12 |
| AH3984G-H   | 17,8             | 400             | 420 | 130 | 8      | 22 | Tr440X5         | M8                  | 7,5 | 12 |
| AH3984-H    | 17,3             | 400             | 420 | 130 | 8      | 22 | Tr435X5         | M8                  | 7,5 | 12 |
| AH3084G-H   | 27,2             | 400             | 420 | 186 | 10     | 34 | Tr440X5         | G1/8                | 8,5 | 12 |
| AH3084-H    | 29,1             | 400             | 420 | 186 | 10     | 34 | Tr450X5         | G1/8                | 8,5 | 12 |
| AH24084-H   | 29,6             | 400             | 420 | 230 | 22     | 30 | Tr440X5         | G1/8                | 8,5 | 12 |
| AH3184G-H   | 42               | 400             | 420 | 266 | 10     | 40 | Tr440X5         | G1/8                | 8,5 | 12 |
| AH3184-H    | 46,4             | 400             | 420 | 266 | 10     | 40 | Tr460X5         | G1/8                | 8,5 | 12 |
| AH24184-H   | 41               | 400             | 420 | 310 | 22     | 30 | Tr440X5         | G1/8                | 8,5 | 12 |
| AH3284G-H   | 53,6             | 400             | 420 | 321 | 10     | 46 | Tr440X5         | G1/8                | 8,5 | 12 |
| AH3284-H    | 58,6             | 400             | 420 | 321 | 10     | 46 | Tr460X5         | G1/8                | 8,5 | 12 |
| AH3384-H    | 67,9             | 400             | 420 | 361 | 10     | 46 | Tr460X5         | G1/8                | 8,5 | 12 |

# Withdrawal sleeves



Taper 1:12

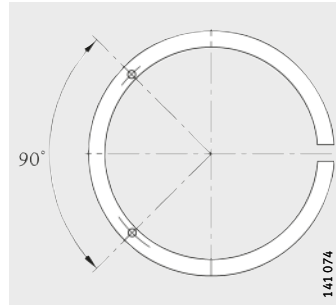
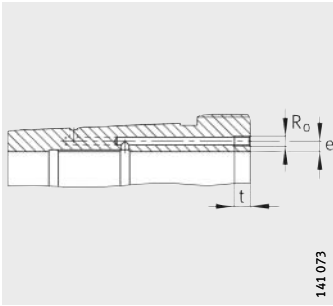


AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

| Designation | Mass<br>m<br>≈ kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|-------------|-------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|             |                   | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH3988-H    | 21,2              | 420             | 440 | 145 | 8      | 25 | Tr460X5         | G1/8                | 8,5 | 12 |
| AHX3088G-H  | 30                | 420             | 440 | 194 | 11     | 35 | Tr460X5         | G1/8                | 8,5 | 12 |
| AHX3088-H   | 31,9              | 420             | 440 | 194 | 11     | 35 | Tr470X5         | G1/8                | 8,5 | 12 |
| AH24088-H   | 32,8              | 420             | 440 | 242 | 22     | 30 | Tr460X5         | G1/8                | 8,5 | 12 |
| AHX3188G-H  | 44,9              | 420             | 440 | 270 | 11     | 42 | Tr460X5         | G1/8                | 8,5 | 12 |
| AHX3188-H   | 49,7              | 420             | 440 | 270 | 11     | 42 | Tr480X5         | G1/8                | 8,5 | 12 |
| AH24188-H   | 42,9              | 420             | 440 | 310 | 22     | 30 | Tr460X5         | G1/8                | 8,5 | 12 |
| AHX3288G-H  | 58,2              | 420             | 440 | 330 | 11     | 48 | Tr460X5         | G1/8                | 8,5 | 12 |
| AHX3288-H   | 63,7              | 420             | 440 | 330 | 11     | 48 | Tr480X5         | G1/8                | 8,5 | 12 |
| AH3388-H    | 79,6              | 420             | 440 | 393 | 11     | 48 | Tr480X5         | G1/8                | 8,5 | 12 |
| AH3992-H    | 22,2              | 440             | 460 | 145 | 8      | 25 | Tr480X5         | G1/8                | 8,5 | 12 |
| AHX3092G-H  | 32,9              | 440             | 460 | 202 | 11     | 37 | Tr480X5         | G1/8                | 8,5 | 12 |
| AHX3092-H   | 35,1              | 440             | 460 | 202 | 11     | 37 | Tr490X5         | G1/8                | 8,5 | 12 |
| AH24092-H   | 35,6              | 440             | 460 | 250 | 23     | 32 | Tr480X5         | G1/8                | 8,5 | 12 |
| AHX3192G-H  | 50,3              | 440             | 460 | 285 | 11     | 43 | Tr480X5         | G1/8                | 8,5 | 12 |
| AHX3192-H   | 58                | 440             | 460 | 285 | 11     | 43 | Tr510X6         | G1/8                | 8,5 | 12 |
| AH24192-H   | 48,7              | 440             | 460 | 332 | 23     | 32 | Tr480X5         | G1/8                | 8,5 | 12 |
| AHX3292G-H  | 65,6              | 440             | 460 | 349 | 11     | 50 | Tr480X5         | G1/8                | 8,5 | 12 |
| AHX3292-H   | 74,6              | 440             | 460 | 349 | 11     | 50 | Tr510X6         | G1/8                | 8,5 | 12 |
| AH3392-H    | 92,6              | 440             | 460 | 415 | 11     | 50 | Tr510X6         | G1/8                | 8,5 | 12 |
| AH3996-H    | 25,7              | 460             | 480 | 158 | 9      | 28 | Tr500X5         | G1/8                | 8,5 | 12 |
| AHX3096G-H  | 35                | 460             | 480 | 205 | 12     | 38 | Tr500X5         | G1/8                | 8,5 | 12 |
| AHX3096-H   | 39,7              | 460             | 480 | 205 | 12     | 38 | Tr520X6         | G1/8                | 8,5 | 12 |
| AH24096-H   | 37,2              | 460             | 480 | 250 | 23     | 32 | Tr500X5         | G1/8                | 8,5 | 12 |
| AHX3196G-H  | 54,8              | 460             | 480 | 295 | 12     | 45 | Tr500X5         | G1/8                | 8,5 | 12 |
| AHX3196-H   | 63,3              | 460             | 480 | 295 | 12     | 45 | Tr530X6         | G1/8                | 8,5 | 12 |
| AH24196G-H  | 52,2              | 460             | 480 | 340 | 23     | 32 | Tr500X5         | G1/8                | 8,5 | 12 |
| AH24196-H   | 52,9              | 460             | 480 | 343 | 25     | 35 | Tr500X5         | G1/8                | 8,5 | 12 |
| AHX3296G-H  | 72,4              | 460             | 480 | 364 | 12     | 52 | Tr500X5         | G1/8                | 8,5 | 12 |
| AHX3296-H   | 82,2              | 460             | 480 | 364 | 12     | 52 | Tr530X6         | G1/8                | 8,5 | 12 |
| AH3396-H    | 100               | 460             | 480 | 427 | 12     | 52 | Tr530X6         | G1/8                | 8,5 | 12 |





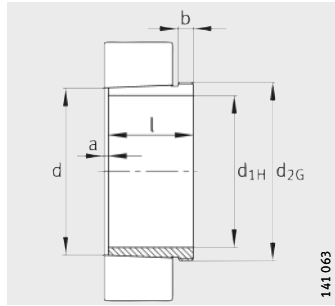
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors  
for hydraulic withdrawal sleeve

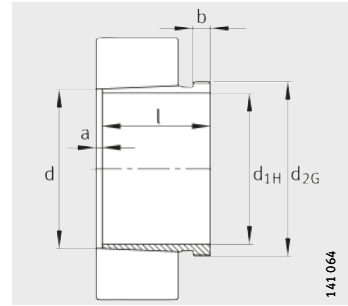
**Dimension table** (continued) - Dimensions in mm

| Designation  | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|--------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|              |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH39/500G-H  | 29,8             | 480             | 500 | 162 | 10     | 32 | Tr530X6         | G1/8                | 8,5 | 12 |
| AH39/500-H   | 27,7             | 480             | 500 | 162 | 10     | 32 | Tr520X6         | G1/8                | 8,5 | 12 |
| AHX30/500G-H | 39,9             | 480             | 500 | 209 | 12     | 40 | Tr530X6         | G1/8                | 8,5 | 12 |
| AHX30/500-H  | 42,5             | 480             | 500 | 209 | 12     | 40 | Tr540X6         | G1/8                | 8,5 | 12 |
| AH240/500G-H | 41,7             | 480             | 500 | 253 | 23     | 35 | Tr530X6         | G1/8                | 8,5 | 12 |
| AH240/500-H  | 39,5             | 480             | 500 | 253 | 23     | 35 | Tr520X6         | G1/8                | 8,5 | 12 |
| AHX31/500G-H | 64,7             | 480             | 500 | 313 | 12     | 47 | Tr530X6         | G1/8                | 8,5 | 12 |
| AHX31/500-H  | 70,9             | 480             | 500 | 313 | 12     | 47 | Tr550X6         | G1/8                | 8,5 | 12 |
| AH241/500G-H | 60,5             | 480             | 500 | 360 | 23     | 35 | Tr530X6         | G1/8                | 8,5 | 12 |
| AH241/500-H  | 58,8             | 480             | 500 | 362 | 25     | 37 | Tr520X6         | G1/8                | 8,5 | 12 |
| AHX32/500G-H | 87,3             | 480             | 500 | 393 | 12     | 54 | Tr530X6         | G1/8                | 8,5 | 12 |
| AHX32/500-H  | 94,4             | 480             | 500 | 393 | 12     | 54 | Tr550X6         | G1/8                | 8,5 | 12 |
| AH33/500-H   | 110              | 480             | 500 | 442 | 12     | 54 | Tr550X6         | G1/8                | 8,5 | 12 |
| AH39/530G-H  | 45,6             | 500             | 530 | 175 | 10     | 37 | Tr560X6         | G1/4                | 10  | 15 |
| AH39/530-H   | 43,1             | 500             | 530 | 175 | 10     | 37 | Tr550X6         | G1/4                | 10  | 15 |
| AH30/530A-H  | 61,7             | 500             | 530 | 230 | 12     | 45 | Tr560X6         | G1/4                | 10  | 15 |
| AH240/530G-H | 67,5             | 500             | 530 | 285 | 24     | 35 | Tr560X6         | G1/4                | 8,5 | 15 |
| AH240/530-H  | 66,8             | 500             | 530 | 290 | 25     | 40 | Tr550X6         | G1/4                | 8,5 | 15 |
| AH31/530A-H  | 92,3             | 500             | 530 | 325 | 12     | 53 | Tr560X6         | G1/4                | 10  | 15 |
| AH241/530G-H | 89               | 500             | 530 | 370 | 24     | 35 | Tr560X6         | G1/4                | 10  | 15 |
| AH241/530-H  | 88,2             | 500             | 530 | 375 | 25     | 40 | Tr550X6         | G1/4                | 10  | 15 |
| AH32/530AG-H | 124              | 500             | 530 | 412 | 12     | 57 | Tr560X6         | G1/4                | 10  | 15 |
| AH32/530A-H  | 132              | 500             | 530 | 412 | 12     | 57 | Tr580X6         | G1/4                | 10  | 15 |
| AH33/530-H   | 155              | 500             | 530 | 469 | 12     | 57 | Tr580X6         | G1/4                | 10  | 15 |
| AH39/560G-H  | 52,3             | 530             | 560 | 180 | 10     | 37 | Tr600X6         | G1/4                | 12  | 15 |
| AH39/560-H   | 47               | 530             | 560 | 180 | 10     | 37 | Tr580X6         | G1/4                | 12  | 15 |
| AH30/560AG-H | 71,6             | 530             | 560 | 240 | 12     | 45 | Tr600X6         | G1/4                | 12  | 15 |
| AH30/560A-H  | 68,4             | 530             | 560 | 240 | 12     | 45 | Tr590X6         | G1/4                | 12  | 15 |
| AH240/560G-H | 77,5             | 530             | 560 | 296 | 24     | 38 | Tr600X6         | G1/4                | 8,5 | 15 |
| AH240/560-H  | 72,7             | 530             | 560 | 298 | 25     | 40 | Tr580X6         | G1/4                | 8,5 | 15 |
| AH31/560AG-H | 105              | 530             | 560 | 335 | 12     | 55 | Tr600X6         | G1/4                | 12  | 15 |
| AH31/560A-H  | 101              | 530             | 560 | 335 | 12     | 55 | Tr590X6         | G1/4                | 12  | 15 |
| AH241/560G-H | 104              | 530             | 560 | 393 | 24     | 38 | Tr600X6         | G1/4                | 12  | 15 |
| AH241/560-H  | 101              | 530             | 560 | 400 | 28     | 45 | Tr580X6         | G1/4                | 12  | 15 |
| AH32/560AG-H | 139              | 530             | 560 | 422 | 12     | 57 | Tr600X6         | G1/4                | 12  | 15 |
| AH32/560A-H  | 144              | 530             | 560 | 422 | 12     | 57 | Tr610X6         | G1/4                | 12  | 15 |
| AH33/560-H   | 166              | 530             | 560 | 475 | 12     | 57 | Tr610X6         | G1/4                | 12  | 15 |

# Withdrawal sleeves



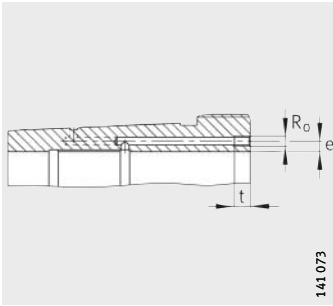
Taper 1:12



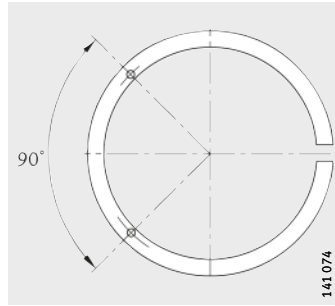
AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

| Designation  | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|--------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|              |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH39/600G-H  | 57               | 570             | 600 | 192 | 10     | 38 | Tr630X6         | G1/4                | 12  | 15 |
| AH39/600-H   | 55,6             | 570             | 600 | 192 | 10     | 38 | Tr625X6         | G1/4                | 12  | 15 |
| AH30/600A-H  | 75               | 570             | 600 | 245 | 14     | 45 | Tr630X6         | G1/4                | 12  | 15 |
| AH240/600G-H | 84,1             | 570             | 600 | 310 | 26     | 38 | Tr630X6         | G1/4                | 8,5 | 15 |
| AH240/600-H  | 85,4             | 570             | 600 | 317 | 30     | 45 | Tr625X6         | G1/4                | 8,5 | 15 |
| AH31/600A-H  | 116              | 570             | 600 | 355 | 14     | 55 | Tr630X6         | G1/4                | 12  | 15 |
| AH241/600G-H | 114              | 570             | 600 | 413 | 26     | 38 | Tr630X6         | G1/4                | 12  | 15 |
| AH241/600-H  | 118              | 570             | 600 | 425 | 30     | 50 | Tr625X6         | G1/4                | 12  | 15 |
| AH32/600AG-H | 155              | 570             | 600 | 445 | 14     | 57 | Tr630X6         | G1/4                | 12  | 15 |
| AH32/600A-H  | 164              | 570             | 600 | 445 | 14     | 57 | Tr650X6         | G1/4                | 12  | 15 |
| AH33/600-H   | 200              | 570             | 600 | 519 | 14     | 57 | Tr650X6         | G1/4                | 12  | 15 |
| AH39/630G-H  | 69,4             | 600             | 630 | 210 | 12     | 40 | Tr670X6         | G1/4                | 12  | 15 |
| AH39/630-H   | 64,5             | 600             | 630 | 210 | 12     | 40 | Tr655X6         | G1/4                | 12  | 15 |
| AH30/630A-H  | 87,3             | 600             | 630 | 258 | 14     | 46 | Tr670X6         | G1/4                | 12  | 15 |
| AH240/630G-H | 97,9             | 600             | 630 | 330 | 26     | 40 | Tr670X6         | G1/4                | 8,5 | 15 |
| AH240/630-H  | 95,1             | 600             | 630 | 335 | 30     | 45 | Tr655X6         | G1/4                | 8,5 | 15 |
| AH31/630A-H  | 136              | 600             | 630 | 375 | 14     | 60 | Tr670X6         | G1/4                | 12  | 15 |
| AH241/630G-H | 133              | 600             | 630 | 440 | 26     | 40 | Tr670X6         | G1/4                | 12  | 15 |
| AH241/630-H  | 132              | 600             | 630 | 450 | 30     | 50 | Tr655X6         | G1/4                | 12  | 15 |
| AH32/630AG-H | 183              | 600             | 630 | 475 | 14     | 63 | Tr670X6         | G1/4                | 12  | 15 |
| AH32/630A-H  | 188              | 600             | 630 | 475 | 14     | 63 | Tr680X6         | G1/4                | 12  | 15 |
| AH33/630-H   | 227              | 600             | 630 | 550 | 14     | 62 | Tr680X6         | G1/4                | 12  | 15 |
| AH39/670G-H  | 92,9             | 630             | 670 | 216 | 12     | 41 | Tr710X7         | G1/4                | 12  | 15 |
| AH39/670-H   | 87,7             | 630             | 670 | 216 | 12     | 41 | Tr695X6         | G1/4                | 12  | 15 |
| AH30/670A-H  | 124              | 630             | 670 | 280 | 14     | 50 | Tr710X7         | G1/4                | 12  | 15 |
| AH240/670G-H | 137              | 630             | 670 | 348 | 26     | 40 | Tr710X7         | G1/4                | 8,5 | 15 |
| AH240/670-H  | 137              | 630             | 670 | 358 | 30     | 50 | Tr695X6         | G1/4                | 8,5 | 15 |
| AH31/670A-H  | 185              | 630             | 670 | 395 | 14     | 60 | Tr710X7         | G1/4                | 12  | 15 |
| AH241/670G-H | 180              | 630             | 670 | 452 | 26     | 40 | Tr710X7         | G1/4                | 12  | 15 |
| AH241/670-H  | 183              | 630             | 670 | 467 | 30     | 55 | Tr695X6         | G1/4                | 12  | 15 |
| AH32/670AG-H | 247              | 630             | 670 | 500 | 14     | 63 | Tr710X7         | G1/4                | 12  | 15 |
| AH32/670A-H  | 252              | 630             | 670 | 500 | 14     | 63 | Tr720X7         | G1/4                | 12  | 15 |
| AH33/670-H   | 303              | 630             | 670 | 577 | 14     | 62 | Tr720X7         | G1/4                | 12  | 15 |



Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

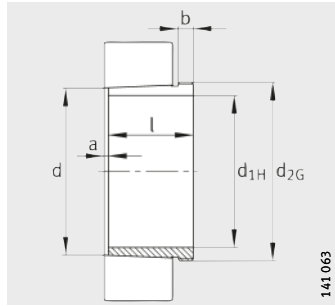


Pump connectors  
for hydraulic withdrawal sleeve

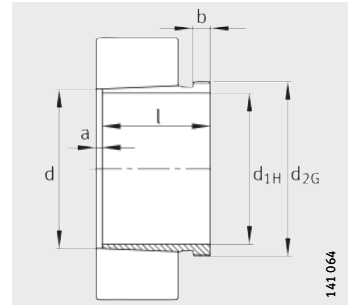
**Dimension table** (continued) - Dimensions in mm

| Designation  | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |     |    |
|--------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|-----|----|
|              |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e   | t  |
| AH39/710G-H  | 105              | 670             | 710 | 228 | 12     | 43 | Tr750X7         | G1/4                | 15  | 15 |
| AH39/710-H   | 101              | 670             | 710 | 228 | 12     | 43 | Tr740X7         | G1/4                | 15  | 15 |
| AH30/710A-H  | 135              | 670             | 710 | 286 | 16     | 50 | Tr750X7         | G1/4                | 15  | 15 |
| AH240/710G-H | 152              | 670             | 710 | 360 | 26     | 45 | Tr750X7         | G1/4                | 8,5 | 15 |
| AH240/710-H  | 151              | 670             | 710 | 365 | 33     | 50 | Tr740X7         | G1/4                | 8,5 | 15 |
| AH31/710A-H  | 202              | 670             | 710 | 405 | 16     | 60 | Tr750X7         | G1/4                | 15  | 15 |
| AH241/710G-H | 207              | 670             | 710 | 483 | 26     | 45 | Tr750X7         | G1/4                | 15  | 15 |
| AH241/710-H  | 209              | 670             | 710 | 493 | 33     | 55 | Tr740X7         | G1/4                | 15  | 15 |
| AH32/710AG-H | 272              | 670             | 710 | 515 | 16     | 65 | Tr750X7         | G1/4                | 15  | 15 |
| AH32/710A-H  | 278              | 670             | 710 | 515 | 16     | 65 | Tr760X7         | G1/4                | 15  | 15 |
| AH33/710-H   | 334              | 670             | 710 | 595 | 16     | 65 | Tr760X7         | G1/4                | 15  | 15 |
| AH39/710G-H  | 62               | 680             | 710 | 163 | 12     | 43 | Tr750X7         | G1/4                | 15  | 15 |
| AH38/710-H   | 58,6             | 680             | 710 | 163 | 12     | 43 | Tr740X7         | G1/4                | 12  | 15 |
| AH39/750G-H  | 118              | 710             | 750 | 234 | 12     | 44 | Tr800X7         | G1/4                | 15  | 15 |
| AH39/750-H   | 110              | 710             | 750 | 234 | 12     | 44 | Tr780X7         | G1/4                | 15  | 15 |
| AH30/750A-H  | 155              | 710             | 750 | 300 | 16     | 50 | Tr800X7         | G1/4                | 15  | 15 |
| AH240/750G-H | 174              | 710             | 750 | 380 | 28     | 45 | Tr800X7         | G1/4                | 8,5 | 15 |
| AH240/750-H  | 169              | 710             | 750 | 385 | 35     | 50 | Tr780X7         | G1/4                | 8,5 | 15 |
| AH31/750A-H  | 232              | 710             | 750 | 425 | 16     | 60 | Tr800X7         | G1/4                | 15  | 15 |
| AH241/750G-H | 241              | 710             | 750 | 520 | 28     | 45 | Tr800X7         | G1/4                | 15  | 15 |
| AH241/750-H  | 239              | 710             | 750 | 530 | 35     | 55 | Tr780X7         | G1/4                | 15  | 15 |
| AH32/750A-H  | 312              | 710             | 750 | 540 | 16     | 65 | Tr800X7         | G1/4                | 15  | 15 |
| AH33/750-H   | 377              | 710             | 750 | 625 | 16     | 65 | Tr800X7         | G1/4                | 15  | 15 |
| AH39/800G-H  | 155              | 750             | 800 | 245 | 12     | 45 | Tr850X7         | G1/4                | 15  | 15 |
| AH39/800-H   | 146              | 750             | 800 | 245 | 12     | 45 | Tr830X7         | G1/4                | 15  | 15 |
| AH30/800A-H  | 198              | 750             | 800 | 308 | 18     | 50 | Tr850X7         | G1/4                | 15  | 15 |
| AH240/800G-H | 232              | 750             | 800 | 395 | 28     | 50 | Tr850X7         | G1/4                | 15  | 15 |
| AH240/800-H  | 221              | 750             | 800 | 395 | 40     | 50 | Tr830X7         | G1/4                | 15  | 15 |
| AH31/800A-H  | 297              | 750             | 800 | 438 | 18     | 63 | Tr850X7         | G1/4                | 15  | 15 |
| AH241/800G-H | 311              | 750             | 800 | 525 | 28     | 50 | Tr850X7         | G1/4                | 15  | 15 |
| AH241/800-H  | 304              | 750             | 800 | 530 | 40     | 55 | Tr830X7         | G1/4                | 15  | 15 |
| AH32/800AG-H | 391              | 750             | 800 | 550 | 18     | 62 | Tr850X7         | G1/4                | 15  | 15 |
| AH32/800A-H  | 396              | 750             | 800 | 555 | 18     | 67 | Tr850X7         | G1/4                | 15  | 15 |
| AH33/800-H   | 500              | 750             | 800 | 667 | 18     | 67 | Tr850X7         | G1/4                | 15  | 15 |

# Withdrawal sleeves



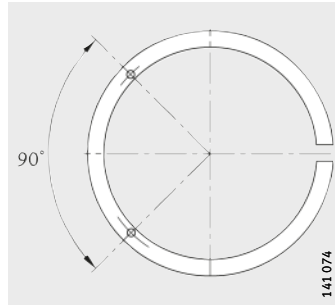
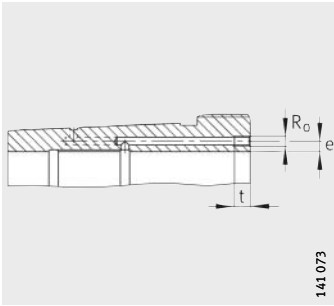
Taper 1:12



AH240, AH241, AH248  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

| Designation  | Mass<br>m<br>≈kg | Dimensions      |     |     |        |    |                 | Mounting dimensions |    |    |
|--------------|------------------|-----------------|-----|-----|--------|----|-----------------|---------------------|----|----|
|              |                  | d <sub>1H</sub> | d   | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e  | t  |
| AH39/850G-H  | 176              | 800             | 850 | 258 | 12     | 50 | Tr900X7         | G1/4                | 15 | 15 |
| AH39/850-H   | 165              | 800             | 850 | 258 | 12     | 50 | Tr880X7         | G1/4                | 15 | 15 |
| AH30/850A-H  | 224              | 800             | 850 | 325 | 18     | 53 | Tr900X7         | G1/4                | 15 | 15 |
| AH240/850G-H | 259              | 800             | 850 | 415 | 30     | 50 | Tr900X7         | G1/4                | 15 | 15 |
| AH240/850-H  | 250              | 800             | 850 | 418 | 40     | 53 | Tr880X7         | G1/4                | 15 | 15 |
| AH31/850A-H  | 336              | 800             | 850 | 462 | 18     | 63 | Tr900X7         | G1/4                | 15 | 15 |
| AH241/850G-H | 358              | 800             | 850 | 560 | 40     | 60 | Tr900X7         | G1/4                | 15 | 15 |
| AH241/850-H  | 345              | 800             | 850 | 560 | 40     | 60 | Tr880X7         | G1/4                | 15 | 15 |
| AH32/850A-H  | 450              | 800             | 850 | 585 | 18     | 70 | Tr900X7         | G1/4                | 15 | 15 |
| AH33/850-H   | 567              | 800             | 850 | 700 | 18     | 70 | Tr900X7         | G1/4                | 15 | 15 |
| AH39/900G-H  | 192              | 850             | 900 | 265 | 12     | 51 | Tr950X8         | G1/4                | 15 | 15 |
| AH39/900-H   | 180              | 850             | 900 | 265 | 12     | 51 | Tr930X8         | G1/4                | 15 | 15 |
| AH30/900A-H  | 246              | 850             | 900 | 335 | 20     | 55 | Tr950X8         | G1/4                | 15 | 15 |
| AH240/900G-H | 287              | 850             | 900 | 430 | 45     | 55 | Tr950X8         | G1/4                | 15 | 15 |
| AH240/900-H  | 274              | 850             | 900 | 430 | 45     | 55 | Tr930X8         | G1/4                | 15 | 15 |
| AH31/900A-H  | 368              | 850             | 900 | 475 | 20     | 63 | Tr950X8         | G1/4                | 15 | 15 |
| AH241/900G-H | 390              | 850             | 900 | 575 | 45     | 60 | Tr950X8         | G1/4                | 15 | 15 |
| AH241/900-H  | 376              | 850             | 900 | 575 | 45     | 60 | Tr930X8         | G1/4                | 15 | 15 |
| AH32/900A-H  | 476              | 850             | 900 | 585 | 20     | 70 | Tr950X8         | G1/4                | 15 | 15 |
| AH33/900-H   | 623              | 850             | 900 | 720 | 20     | 70 | Tr950X8         | G1/4                | 15 | 15 |
| AH39/900G-H  | 116              | 860             | 900 | 193 | 12     | 51 | Tr950X8         | G1/4                | 15 | 15 |
| AH38/900-H   | 109              | 860             | 900 | 193 | 12     | 51 | Tr930X8         | G1/4                | 15 | 15 |
| AH39/950G-H  | 216              | 900             | 950 | 282 | 15     | 51 | Tr1000X8        | G1/4                | 15 | 15 |
| AH39/950-H   | 203              | 900             | 950 | 282 | 15     | 51 | Tr980X8         | G1/4                | 15 | 15 |
| AH30/950A-H  | 277              | 900             | 950 | 355 | 20     | 55 | Tr1000X8        | G1/4                | 15 | 15 |
| AH240/950G-H | 329              | 900             | 950 | 467 | 45     | 55 | Tr1000X8        | G1/4                | 15 | 15 |
| AH240/950-H  | 316              | 900             | 950 | 467 | 45     | 55 | Tr980X8         | G1/4                | 15 | 15 |
| AH31/950A-H  | 414              | 900             | 950 | 500 | 20     | 63 | Tr1000X8        | G1/4                | 15 | 15 |
| AH32/950A-H  | 519              | 900             | 950 | 600 | 20     | 70 | Tr1000X8        | G1/4                | 15 | 15 |
| AH241/950G-H | 435              | 900             | 950 | 605 | 45     | 60 | Tr1000X8        | G1/4                | 15 | 15 |
| AH241/950-H  | 421              | 900             | 950 | 605 | 45     | 60 | Tr980X8         | G1/4                | 15 | 15 |
| AH33/950-H   | 683              | 900             | 950 | 740 | 20     | 70 | Tr1000X8        | G1/4                | 15 | 15 |



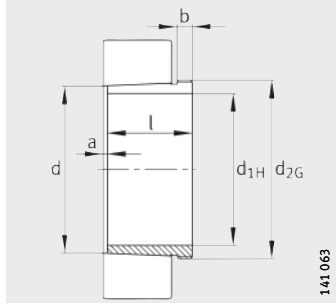
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors  
for hydraulic withdrawal sleeve

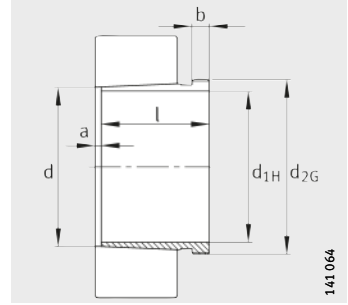
**Dimension table** (continued) - Dimensions in mm

| Designation   | Mass<br>m<br>≈kg | Dimensions      |       |     |        |    |                 | Mounting dimensions |    |    |
|---------------|------------------|-----------------|-------|-----|--------|----|-----------------|---------------------|----|----|
|               |                  | d <sub>1H</sub> | d     | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e  | t  |
| AH39/1000G-H  | 246              | 950             | 1 000 | 296 | 15     | 52 | Tr1060X8        | G1/4                | 15 | 15 |
| AH39/1000-H   | 229              | 950             | 1 000 | 296 | 15     | 52 | Tr1035X8        | G1/4                | 15 | 15 |
| AH30/1 000A-H | 309              | 950             | 1 000 | 365 | 22     | 57 | Tr1060X8        | G1/4                | 15 | 15 |
| AH240/1000G-H | 357              | 950             | 1 000 | 469 | 50     | 57 | Tr1060X8        | G1/4                | 15 | 15 |
| AH240/1000-H  | 339              | 950             | 1 000 | 469 | 50     | 57 | Tr1035X8        | G1/4                | 15 | 15 |
| AH31/1 000A-H | 471              | 950             | 1 000 | 525 | 22     | 63 | Tr1060X8        | G1/4                | 15 | 15 |
| AH32/1000A-H  | 591              | 950             | 1 000 | 630 | 22     | 70 | Tr1060X8        | G1/4                | 15 | 15 |
| AH241/1000-H  | 502              | 950             | 1 000 | 645 | 50     | 65 | Tr1060X8        | G1/4                | 15 | 15 |
| AH33/1000-H   | 781              | 950             | 1 000 | 780 | 22     | 70 | Tr1060X8        | G1/4                | 15 | 15 |
| AH39/1060G-H  | 312              | 1 000           | 1 060 | 310 | 15     | 52 | Tr1120X8        | G1/4                | 15 | 15 |
| AH39/1060-H   | 294              | 1 000           | 1 060 | 310 | 15     | 52 | Tr1095X8        | G1/4                | 15 | 15 |
| AH30/1 060A-H | 396              | 1 000           | 1 060 | 385 | 22     | 60 | Tr1120X8        | G1/4                | 15 | 15 |
| AH240/1060G-H | 465              | 1 000           | 1 060 | 498 | 50     | 60 | Tr1120X8        | G1/4                | 15 | 15 |
| AH240/1060-H  | 445              | 1 000           | 1 060 | 498 | 50     | 60 | Tr1095X8        | G1/4                | 15 | 15 |
| AH31/1060A-H  | 583              | 1 000           | 1 060 | 540 | 22     | 65 | Tr1120X8        | G1/4                | 15 | 15 |
| AH241/1060-H  | 632              | 1 000           | 1 060 | 665 | 50     | 65 | Tr1120X8        | G1/4                | 15 | 15 |
| AH241/1060-H  | 169              | 1 020           | 1 060 | 270 | 37     | 52 | Tr1095X8        | G1/4                | 15 | 15 |
| AH30/1 120A-H | 451              | 1 060           | 1 120 | 410 | 22     | 65 | Tr1180X8        | G1/4                | 15 | 15 |
| AH240/1120G-H | 524              | 1 060           | 1 120 | 527 | 50     | 65 | Tr1180X8        | G1/4                | 15 | 15 |
| AH240/1120-H  | 501              | 1 060           | 1 120 | 527 | 50     | 65 | Tr1155X8        | G1/4                | 15 | 15 |
| AH241/1120-H  | 717              | 1 060           | 1 120 | 705 | 50     | 75 | Tr1180X8        | G1/4                | 15 | 15 |
| AH39/1120G-H  | 289              | 1 070           | 1 120 | 310 | 15     | 52 | Tr1180X8        | G1/4                | 15 | 15 |
| AH39/1120-H   | 271              | 1 070           | 1 120 | 310 | 15     | 52 | Tr1155X8        | G1/4                | 15 | 15 |
| AH30/1 180A-H | 498              | 1 120           | 1 180 | 420 | 22     | 65 | Tr1250X8        | G1/4                | 15 | 15 |
| AH240/1180G-H | 577              | 1 120           | 1 180 | 540 | 50     | 65 | Tr1250X8        | G1/4                | 15 | 15 |
| AH240/1180-H  | 543              | 1 120           | 1 180 | 540 | 50     | 65 | Tr1215X8        | G1/4                | 15 | 15 |
| AH241/1180-H  | 824              | 1 120           | 1 180 | 750 | 50     | 80 | Tr1250X8        | G1/4                | 15 | 15 |
| AH39/1180G-H  | 336              | 1 130           | 1 180 | 330 | 15     | 55 | Tr1250X8        | G1/4                | 15 | 15 |
| AH39/1180-H   | 307              | 1 130           | 1 180 | 330 | 15     | 55 | Tr1215X8        | G1/4                | 15 | 15 |
| AH30/1 250A-H | 629              | 1 180           | 1 250 | 445 | 22     | 70 | Tr1320X8        | G1/4                | 15 | 15 |
| AH240/1250G-H | 733              | 1 180           | 1 250 | 570 | 50     | 70 | Tr1320X8        | G1/4                | 15 | 15 |
| AH240/1250-H  | 694              | 1 180           | 1 250 | 570 | 50     | 70 | Tr1285X8        | G1/4                | 15 | 15 |
| AH241/1250-H  | 1 050            | 1 180           | 1 250 | 795 | 50     | 85 | Tr1320X8        | G1/4                | 15 | 15 |

# Withdrawal sleeves



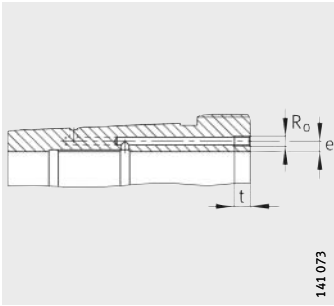
Taper 1:12



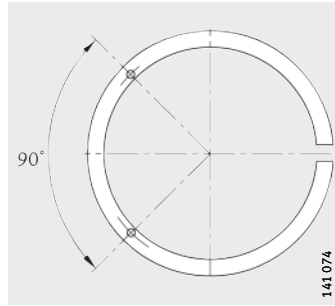
AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

| Designation   | Mass<br>m<br>≈ kg | Dimensions      |       |     |        |    |                 | Mounting dimensions |    |    |
|---------------|-------------------|-----------------|-------|-----|--------|----|-----------------|---------------------|----|----|
|               |                   | d <sub>1H</sub> | d     | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e  | t  |
| AH39/1250G-H  | 367               | <b>1 200</b>    | 1 250 | 340 | 18     | 55 | Tr1320X8        | G1/4                | 15 | 15 |
| AH39/1250-H   | 336               | <b>1 200</b>    | 1 250 | 340 | 18     | 55 | Tr1285X8        | G1/4                | 15 | 15 |
| AH30/1 320A-H | 718               | <b>1 250</b>    | 1 320 | 470 | 22     | 70 | Tr1400X8        | G1/4                | 15 | 15 |
| AH240/1320G-H | 828               | <b>1 250</b>    | 1 320 | 600 | 50     | 70 | Tr1400X8        | G1/4                | 15 | 15 |
| AH240/1320-H  | 775               | <b>1 250</b>    | 1 320 | 600 | 50     | 70 | Tr1355X8        | G1/4                | 15 | 15 |
| AH241/1320-H  | 1 190             | <b>1 250</b>    | 1 320 | 840 | 50     | 90 | Tr1400X8        | G1/4                | 15 | 15 |
| AH39/1320G-H  | 421               | <b>1 270</b>    | 1 320 | 360 | 18     | 55 | Tr1400X8        | G1/4                | 15 | 15 |
| AH39/1320-H   | 379               | <b>1 270</b>    | 1 320 | 360 | 18     | 55 | Tr1355X8        | G1/4                | 15 | 15 |
| AH30/1 400A-H | 902               | <b>1 320</b>    | 1 400 | 487 | 22     | 75 | Tr1500X8        | G1/4                | 15 | 15 |
| AH240/1400G-H | 1 030             | <b>1 320</b>    | 1 400 | 615 | 50     | 70 | Tr1500X8        | G1/4                | 15 | 15 |
| AH240/1400-H  | 944               | <b>1 320</b>    | 1 400 | 615 | 50     | 70 | Tr1435X8        | G1/4                | 15 | 15 |
| AH241/1400-H  | 1 500             | <b>1 320</b>    | 1 400 | 870 | 50     | 95 | Tr1500X8        | G1/4                | 15 | 15 |
| AH39/1400G-H  | 499               | <b>1 350</b>    | 1 400 | 380 | 20     | 60 | Tr1500X8        | G1/4                | 15 | 15 |
| AH39/1400-H   | 429               | <b>1 350</b>    | 1 400 | 380 | 20     | 60 | Tr1435X8        | G1/4                | 15 | 15 |



Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions



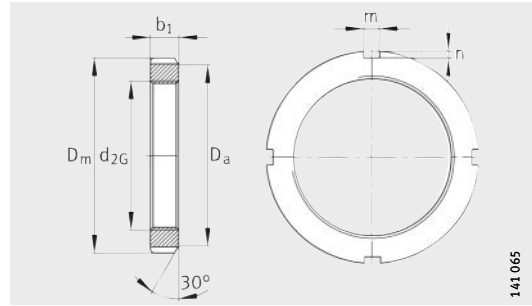
Pump connectors  
for hydraulic withdrawal sleeve

**Dimension table** (continued) - Dimensions in mm

| Designation         | Mass<br>m<br>≈kg | Dimensions      |       |     |        |    |                 | Mounting dimensions |    |    |
|---------------------|------------------|-----------------|-------|-----|--------|----|-----------------|---------------------|----|----|
|                     |                  | d <sub>1H</sub> | d     | l   | a<br>≈ | b  | d <sub>2G</sub> | R <sub>0</sub>      | e  | t  |
| <b>AH30/1500A-H</b> | 1 260            | <b>1 400</b>    | 1 500 | 537 | 22     | 75 | Tr1600X8        | G1/4                | 15 | 15 |
| <b>AH241/1500-H</b> | 1 960            | <b>1 400</b>    | 1 500 | 895 | 50     | 95 | Tr1600X8        | G1/4                | 15 | 15 |
| <b>AH39/1500G-H</b> | 405              | <b>1 450</b>    | 1 500 | 306 | 20     | 60 | Tr1600X8        | G1/4                | 15 | 15 |
| <b>AH38/1500-H</b>  | 365              | <b>1 450</b>    | 1 500 | 306 | 20     | 60 | Tr1540X8        | G1/4                | 15 | 15 |
| <b>AH39/1500G-H</b> | 563              | <b>1 450</b>    | 1 500 | 400 | 20     | 60 | Tr1600X8        | G1/4                | 15 | 15 |
| <b>AH39/1500-H</b>  | 494              | <b>1 450</b>    | 1 500 | 400 | 20     | 60 | Tr1540X8        | G1/4                | 15 | 15 |



# Locknuts



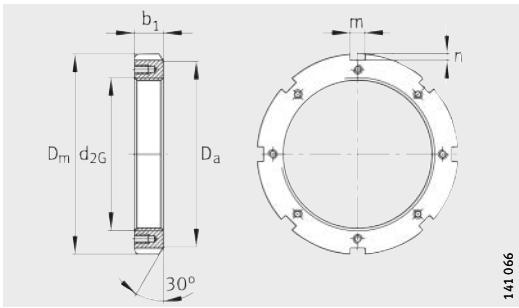
KM, KML, HM..T

141065

**Dimension table** - Dimensions in mm

| Designation   |                      | Mass<br>m<br>≈kg | Dimensions     |       |       |       |    |    |
|---------------|----------------------|------------------|----------------|-------|-------|-------|----|----|
| Nut           | Suitable<br>retainer |                  | $d_{2G}$       | $D_m$ | $b_1$ | $D_a$ | m  | n  |
| <b>KML26</b>  | MBL26                | 0,9              | <b>M130X2</b>  | 155   | 21    | 145   | 12 | 5  |
| <b>KM26</b>   | MB26                 | 1,24             | <b>M130X2</b>  | 165   | 21    | 149   | 12 | 5  |
| <b>KM27</b>   | MB27                 | 1,55             | <b>M135X2</b>  | 175   | 22    | 160   | 14 | 6  |
| <b>KML28</b>  | MBL28                | 1,01             | <b>M140X2</b>  | 165   | 22    | 155   | 12 | 5  |
| <b>KM28</b>   | MB28                 | 1,56             | <b>M140X2</b>  | 180   | 22    | 160   | 14 | 6  |
| <b>KM29</b>   | MB29                 | 2,05             | <b>M145X2</b>  | 190   | 24    | 171   | 14 | 6  |
| <b>KML30</b>  | MBL30                | 1,44             | <b>M150X2</b>  | 180   | 24    | 170   | 14 | 5  |
| <b>KM30</b>   | MB30                 | 2,06             | <b>M150X2</b>  | 195   | 24    | 171   | 14 | 6  |
| <b>KM31</b>   | MB31                 | 2,27             | <b>M155X3</b>  | 200   | 25    | 182   | 16 | 7  |
| <b>KML32</b>  | MBL32                | 1,62             | <b>M160X3</b>  | 190   | 25    | 180   | 14 | 5  |
| <b>KM32</b>   | MB32                 | 2,52             | <b>M160X3</b>  | 210   | 25    | 182   | 16 | 7  |
| <b>KM33</b>   | MB33                 | 2,7              | <b>M165X3</b>  | 210   | 26    | 193   | 16 | 7  |
| <b>KML34</b>  | MBL34                | 1,72             | <b>M170X3</b>  | 200   | 26    | 190   | 16 | 5  |
| <b>KM34</b>   | MB34                 | 2,8              | <b>M170X3</b>  | 220   | 26    | 193   | 16 | 7  |
| <b>KML36</b>  | MBL36                | 1,96             | <b>M180X3</b>  | 210   | 27    | 200   | 16 | 5  |
| <b>KM36</b>   | MB36                 | 3,04             | <b>M180X3</b>  | 230   | 27    | 203   | 18 | 8  |
| <b>KML38</b>  | MBL38                | 2,13             | <b>M190X3</b>  | 220   | 28    | 210   | 16 | 5  |
| <b>KM38</b>   | MB38                 | 3,34             | <b>M190X3</b>  | 240   | 28    | 214   | 18 | 8  |
| <b>KML40</b>  | MBL40                | 2,9              | <b>M200X3</b>  | 240   | 29    | 220   | 18 | 8  |
| <b>KM40</b>   | MB40                 | 3,69             | <b>M200X3</b>  | 250   | 29    | 226   | 18 | 8  |
| <b>HM3044</b> | MS3044               | 3,21             | <b>Tr220X4</b> | 260   | 30    | 242   | 20 | 9  |
| <b>HM44T</b>  | MB44                 | 5,3              | <b>Tr220X4</b> | 280   | 32    | 250   | 20 | 10 |
| <b>HM3144</b> | MS3144               | 4,93             | <b>Tr220X4</b> | 280   | 32    | 250   | 20 | 10 |
| <b>HM3048</b> | MS3048               | 5,12             | <b>Tr240X4</b> | 290   | 34    | 270   | 20 | 10 |
| <b>HM48T</b>  | MB48                 | 6,15             | <b>Tr240X4</b> | 300   | 34    | 270   | 20 | 10 |
| <b>HM3148</b> | MS3144               | 5,75             | <b>Tr240X4</b> | 300   | 34    | 270   | 20 | 10 |
| <b>HM3052</b> | MS3048               | 5,54             | <b>Tr260X4</b> | 310   | 34    | 290   | 20 | 10 |
| <b>HM52T</b>  | MB52                 | 8,05             | <b>Tr260X4</b> | 330   | 35    | 300   | 24 | 12 |
| <b>HM3152</b> | MS3152               | 7,43             | <b>Tr260X4</b> | 330   | 36    | 300   | 24 | 12 |
| <b>HM3056</b> | MS3056               | 6,61             | <b>Tr280X4</b> | 330   | 38    | 310   | 24 | 10 |
| <b>HM56T</b>  | MB56                 | 8,9              | <b>Tr280X4</b> | 350   | 36    | 320   | 24 | 12 |
| <b>HM3156</b> | MS3152               | 8,26             | <b>Tr280X4</b> | 350   | 38    | 320   | 24 | 12 |

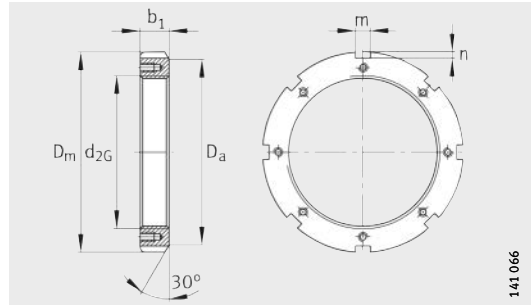




HM30, HM31

| Dimension table (continued) - Dimensions in mm |                      |                   |                 |                |                |                |    |    |
|--|----------------------|-------------------|-----------------|----------------|----------------|----------------|----|----|
| Designation                                    |                      | Mass<br>m<br>≈ kg | Dimensions      |                |                |                |    |    |
| Nut  | Suitable<br>retainer |                   | d <sub>2G</sub> | D <sub>m</sub> | b <sub>1</sub> | D <sub>a</sub> | m  | n  |
| HM3060   | MS3060               | 9,48              | Tr300X4         | 360            | 42             | 336            | 24 | 12 |
| HM3160   | MS3160               | 11,4              | Tr300X4         | 380            | 40             | 340            | 24 | 12 |
| HM3064   | MS3064               | 10,1              | Tr320X5         | 380            | 42             | 356            | 24 | 12 |
| HM3164   | MS3164               | 12,8              | Tr320X5         | 400            | 42             | 360            | 24 | 12 |
| HM3068   | MS3064               | 11,5              | Tr340X5         | 400            | 45             | 376            | 24 | 12 |
| HM3168   | MS3168               | 23                | Tr340X5         | 440            | 55             | 400            | 28 | 15 |
| HM3072   | MS3072               | 11,9              | Tr360X5         | 420            | 45             | 394            | 28 | 13 |
| HM3172   | MS3168               | 25,7              | Tr360X5         | 460            | 58             | 420            | 28 | 15 |
| HM3076   | MS3076               | 15,9              | Tr380X5         | 450            | 48             | 422            | 28 | 14 |
| HM3176   | MS3176               | 30                | Tr380X5         | 490            | 60             | 440            | 32 | 18 |
| HM3080   | MS3076               | 18,2              | Tr400X5         | 470            | 52             | 442            | 28 | 14 |
| HM3180   | MS3180               | 35,7              | Tr400X5         | 520            | 62             | 460            | 32 | 18 |
| HM3084   | MS3084               | 18,9              | Tr420X5         | 490            | 52             | 462            | 32 | 14 |
| HM3184   | MS3180               | 43,4              | Tr420X5         | 540            | 70             | 490            | 32 | 18 |
| HM3088   | MS3088               | 26,5              | Tr440X5         | 520            | 60             | 490            | 32 | 15 |
| HM3188   | MS3188               | 44,3              | Tr440X5         | 560            | 70             | 510            | 36 | 20 |
| HM3092   | MS3088               | 27,7              | Tr460X5         | 540            | 60             | 510            | 32 | 15 |
| HM3192   | MS3188               | 53,8              | Tr460X5         | 580            | 75             | 540            | 36 | 20 |
| HM3096   | MS3096               | 28,7              | Tr480X5         | 560            | 60             | 530            | 36 | 15 |
| HM3196   | MS3196               | 62,2              | Tr480X5         | 620            | 75             | 560            | 36 | 20 |
| HM30/500                                       | MS3096               | 34                | Tr500X5         | 580            | 68             | 550            | 36 | 15 |
| HM31/500                                       | MS31/500             | 62,1              | Tr500X5         | 630            | 80             | 580            | 40 | 23 |
| HM30/530                                       | MS30/530             | 44,7              | Tr530X6         | 630            | 68             | 590            | 40 | 20 |
| HM31/530                                       | MS31/530             | 71,2              | Tr530X6         | 670            | 80             | 610            | 40 | 23 |
| HM30/560                                       | MS30/560             | 46,2              | Tr560X6         | 650            | 75             | 610            | 40 | 20 |
| HM31/560                                       | MS31/560             | 85,6              | Tr560X6         | 710            | 85             | 650            | 45 | 25 |
| HM30/600                                       | MS30/530             | 55,9              | Tr600X6         | 700            | 75             | 660            | 40 | 20 |
| HM31/600                                       | MS31/560             | 91,7              | Tr600X6         | 750            | 85             | 690            | 45 | 25 |
| HM30/630                                       | MS30/630             | 58,3              | Tr630X6         | 730            | 75             | 690            | 45 | 20 |
| HM31/630                                       | MS31/630             | 122               | Tr630X6         | 800            | 95             | 730            | 50 | 28 |
| HM30/670                                       | MS30/670             | 73,8              | Tr670X6         | 780            | 80             | 740            | 45 | 20 |
| HM31/670                                       | MS31/670             | 156               | Tr670X6         | 850            | 106            | 775            | 50 | 28 |
| HM30/710                                       | MS30/710             | 94,8              | Tr710X7         | 830            | 90             | 780            | 50 | 25 |
| HM31/710                                       | MS31/710             | 173               | Tr710X7         | 900            | 106            | 825            | 55 | 30 |

# Locknuts

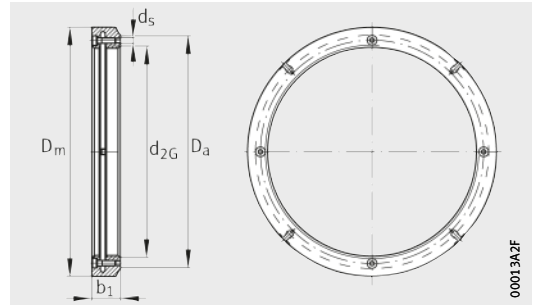


HM30, HM31, Z-1..HM

141 066

| Dimension table (continued) · Dimensions in mm |                      |                  |            |       |       |       |    |    |
|--|----------------------|------------------|------------|-------|-------|-------|----|----|
| Designation                                    |                      | Mass<br>m<br>≈kg | Dimensions |       |       |       |    |    |
| Nut  | Suitable<br>retainer |                  | $d_{2G}$   | $D_m$ | $b_1$ | $D_a$ | m  | n  |
| HM30/750                                       | MS30/750             | 99,5             | Tr750X7    | 870   | 90    | 820   | 55 | 25 |
| HM31/750                                       | MS31/750             | 202              | Tr750X7    | 950   | 112   | 875   | 60 | 34 |
| HM30/800                                       | MS30/750             | 106              | Tr800X7    | 920   | 90    | 870   | 55 | 25 |
| HM31/800                                       | MS31/750             | 215              | Tr800X7    | 1 000 | 112   | 925   | 60 | 34 |
| HM30/850                                       | MS30/850             | 113              | Tr850X7    | 980   | 90    | 925   | 60 | 25 |
| HM31/850                                       | MS31/850             | 246              | Tr850X7    | 1 060 | 118   | 975   | 70 | 38 |
| HM30/900                                       | MS30/850             | 135              | Tr900X7    | 1 030 | 100   | 975   | 60 | 25 |
| HM31/900                                       | MS31/900             | 293              | Tr900X7    | 1 120 | 125   | 1 030 | 70 | 38 |
| HM30/950                                       | MS30/950             | 143              | Tr950X8    | 1 080 | 100   | 1 025 | 60 | 25 |
| HM31/950                                       | MS31/950             | 310              | Tr950X8    | 1 170 | 125   | 1 080 | 70 | 38 |
| HM30/1000                                      | MS30/1000            | 165              | Tr1000X8   | 1 140 | 100   | 1 085 | 60 | 25 |
| HM31/1000                                      | MS31/1000            | 361              | Tr1000X8   | 1 240 | 125   | 1 140 | 70 | 38 |
| Z-195070.01.HM                                 | MS30/560             | 94               | Tr1060X8   | 1 150 | 80    | 1 108 | 40 | 21 |
| HM30/1060                                      | MS30/1000            | 175              | Tr1060X8   | 1 200 | 100   | 1 145 | 60 | 25 |
| HM31/1060                                      | MS31/1000            | 386              | Tr1060X8   | 1 300 | 125   | 1 210 | 70 | 38 |
| HM30/1120                                      | MS30/1000            | 185              | Tr1120X8   | 1 260 | 100   | 1 205 | 60 | 25 |
| HM31/1120                                      | MS31/1000            | 427              | Tr1120X8   | 1 360 | 125   | 1 270 | 70 | 38 |
| HM30/1180                                      | MS30/1000            | 196              | Tr1180X8   | 1 320 | 100   | 1 265 | 60 | 25 |
| HM31/1180                                      | MS31/1000            | 459              | Tr1180X8   | 1 420 | 125   | 1 330 | 70 | 38 |
| HM30/1250                                      | MS30/1000            | 233              | Tr1250X8   | 1 390 | 110   | 1 335 | 60 | 25 |
| HM31/1250                                      | MS31/1000            | 485              | Tr1250X8   | 1 490 | 125   | 1 400 | 70 | 38 |
| HM30/1320                                      | MS30/1000            | 245              | Tr1320X8   | 1 460 | 110   | 1 405 | 60 | 25 |
| HM31/1320                                      | MS31/1000            | 511              | Tr1320X8   | 1 560 | 125   | 1 470 | 70 | 38 |
| HM30/1400                                      | MS30/1000            | 259              | Tr1400X8   | 1 540 | 110   | 1 485 | 60 | 25 |
| HM31/1400                                      | MS31/1000            | 562              | Tr1400X8   | 1 640 | 130   | 1 550 | 70 | 38 |
| HM30/1500                                      | MS30/1500            | 297              | Tr1500X8   | 1 650 | 110   | 1 595 | 60 | 25 |
| HM31/1500                                      | MS31/1000            | 601              | Tr1500X8   | 1 740 | 130   | 1 650 | 70 | 38 |
| Z-195077.01.HM                                 | MS30/850             | 273              | Tr1600X8   | 1 730 | 100   | 1 675 | 60 | 25 |
| Z-195078.01.HM                                 | MS30/850             | 273              | Tr1700X8   | 1 730 | 100   | 1 775 | 60 | 25 |

# Shaft nuts



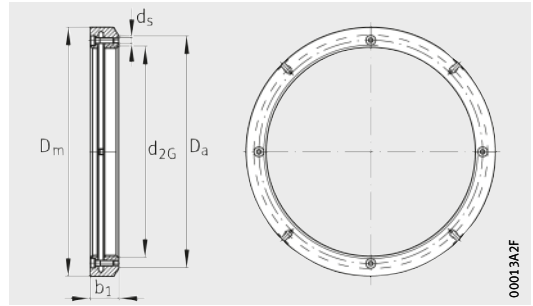
HMZ, HMZ30

00013A-ZF

**Dimension table** - Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions      |                |                |                |                | Clamping<br>screw<br>Quantity | Tightening torque<br>per clamping screw<br>M <sub>aL</sub><br>Nm |
|-------------|------------------|-----------------|----------------|----------------|----------------|----------------|-------------------------------|--|
|             |                  | d <sub>2G</sub> | D <sub>m</sub> | b <sub>1</sub> | D <sub>a</sub> | d <sub>s</sub> |                               |  |
| HMZ26       | 1,3              | <b>M130X2</b>   | 165            | 21             | 149            | M6             | 4                             | 11   |
| HMZ27       | 1,6              | <b>M135X2</b>   | 175            | 22             | 160            | M6             | 4                             | 11   |
| HMZ28       | 1,6              | <b>M140X2</b>   | 180            | 22             | 160            | M6             | 4                             | 11   |
| HMZ29       | 2,2              | <b>M145X2</b>   | 190            | 24             | 171            | M6             | 4                             | 11   |
| HMZ30       | 2,2              | <b>M150X2</b>   | 195            | 24             | 171            | M6             | 4                             | 11   |
| HMZ31       | 2,4              | <b>M155X3</b>   | 200            | 25             | 182            | M6             | 4                             | 11   |
| HMZ32       | 2,6              | <b>M160X3</b>   | 210            | 25             | 182            | M6             | 4                             | 11   |
| HMZ33       | 2,8              | <b>M165X3</b>   | 210            | 26             | 193            | M8             | 4                             | 27   |
| HMZ34       | 2,9              | <b>M170X3</b>   | 220            | 26             | 193            | M8             | 4                             | 27   |
| HMZ36       | 3,2              | <b>M180X3</b>   | 230            | 27             | 203            | M8             | 4                             | 27   |
| HMZ38       | 3,5              | <b>M190X3</b>   | 240            | 28             | 214            | M8             | 4                             | 27   |
| HMZ40       | 3,9              | <b>M200X3</b>   | 250            | 29             | 226            | M8             | 4                             | 27   |
| HMZ3044     | 3,4              | <b>Tr220X4</b>  | 260            | 30             | 242            | M8             | 4                             | 27   |
| HMZ3048     | 5,4              | <b>Tr240X4</b>  | 290            | 34             | 270            | M10            | 4                             | 54   |
| HMZ3052     | 5,8              | <b>Tr260X4</b>  | 310            | 34             | 290            | M10            | 4                             | 54   |
| HMZ3056     | 6,9              | <b>Tr280X4</b>  | 330            | 38             | 310            | M10            | 4                             | 54   |
| HMZ3060     | 10               | <b>Tr300X4</b>  | 360            | 42             | 336            | M10            | 4                             | 54   |
| HMZ3064     | 10,6             | <b>Tr320X5</b>  | 380            | 42             | 356            | M10            | 4                             | 54   |
| HMZ3068     | 12,1             | <b>Tr340X5</b>  | 400            | 45             | 376            | M12            | 4                             | 93   |
| HMZ3072     | 12,5             | <b>Tr360X5</b>  | 420            | 45             | 394            | M12            | 4                             | 93   |
| HMZ3076     | 16,7             | <b>Tr380X5</b>  | 450            | 48             | 422            | M12            | 4                             | 93   |
| HMZ3080     | 19,1             | <b>Tr400X5</b>  | 470            | 52             | 442            | M16            | 4                             | 230  |
| HMZ3084     | 19,8             | <b>Tr420X5</b>  | 490            | 52             | 462            | M16            | 4                             | 230  |
| HMZ3088     | 27,8             | <b>Tr440X5</b>  | 520            | 60             | 490            | M16            | 4                             | 230  |
| HMZ3092     | 29,1             | <b>Tr460X5</b>  | 540            | 60             | 510            | M16            | 4                             | 230  |
| HMZ3096     | 30,1             | <b>Tr480X5</b>  | 560            | 60             | 530            | M16            | 4                             | 230  |
| HMZ30/500   | 35,7             | <b>Tr500X5</b>  | 580            | 68             | 550            | M20            | 4                             | 464  |
| HMZ30/530   | 46,9             | <b>Tr530X6</b>  | 630            | 68             | 590            | M20            | 4                             | 464  |
| HMZ30/560   | 48,5             | <b>Tr560X6</b>  | 650            | 75             | 610            | M20            | 4                             | 464  |
| HMZ30/600   | 58,7             | <b>Tr600X6</b>  | 700            | 75             | 660            | M20            | 4                             | 464  |
| HMZ30/630   | 61,2             | <b>Tr630X6</b>  | 730            | 75             | 690            | M20            | 4                             | 464  |
| HMZ30/670   | 77,5             | <b>Tr670X6</b>  | 780            | 80             | 740            | M20            | 4                             | 464  |
| HMZ30/710   | 99,5             | <b>Tr710X7</b>  | 830            | 90             | 780            | M20            | 4                             | 464  |

# Shaft nuts

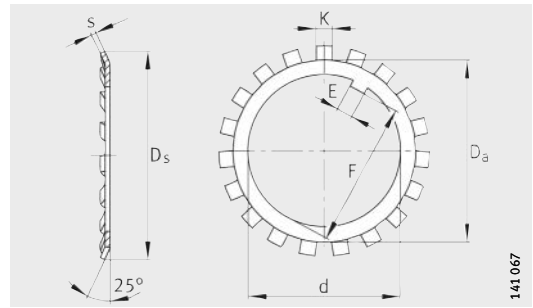


HMZ30

**Dimension table** - Dimensions in mm

| Designation | Mass<br>m<br>≈ kg | Dimensions      |                |                |                |                | Clamping screw<br>Quantity | Tightening torque<br>per clamping screw<br>MaL<br>Nm |
|-------------|-------------------|-----------------|----------------|----------------|----------------|----------------|----------------------------|--|
|             |                   | d <sub>2G</sub> | D <sub>m</sub> | b <sub>1</sub> | D <sub>a</sub> | d <sub>s</sub> |                            |  |
| HMZ30/750   | 105               | Tr750X7         | 870            | 90             | 820            | M20            | 4                          | 464  |
| HMZ30/800   | 111               | Tr800X7         | 920            | 90             | 870            | M20            | 4                          | 464  |
| HMZ30/850   | 119               | Tr850X7         | 980            | 90             | 925            | M20            | 4                          | 464  |
| HMZ30/900   | 142               | Tr900X7         | 1030           | 100            | 975            | M24            | 8                          | 798  |
| HMZ30/950   | 150               | Tr950X8         | 1080           | 100            | 1025           | M24            | 8                          | 798  |
| HMZ30/1000  | 173               | Tr1000X8        | 1140           | 100            | 1085           | M24            | 8                          | 798  |
| HMZ30/1060  | 184               | Tr1060X8        | 1200           | 100            | 1145           | M24            | 8                          | 798  |
| HMZ30/1120  | 194               | Tr1120X8        | 1260           | 100            | 1205           | M24            | 8                          | 798  |
| HMZ30/1180  | 206               | Tr1180X8        | 1320           | 100            | 1265           | M24            | 8                          | 798  |
| HMZ30/1250  | 245               | Tr1250X8        | 1390           | 110            | 1335           | M24            | 8                          | 798  |
| HMZ30/1320  | 257               | Tr1320X8        | 1460           | 110            | 1405           | M24            | 8                          | 798  |
| HMZ30/1400  | 272               | Tr1400X8        | 1540           | 110            | 1485           | M24            | 8                          | 798  |
| HMZ30/1500  | 312               | Tr1500X8        | 1650           | 110            | 1595           | M24            | 8                          | 798  |

# Tab washers



MB, MBL

144.067

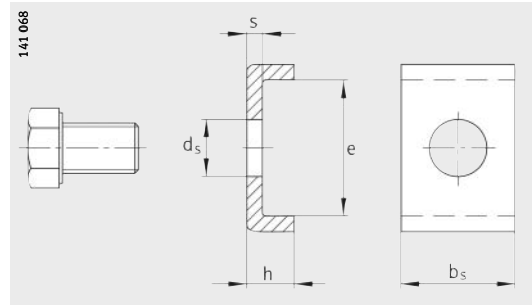
**Dimension table** · Dimensions in mm

| Designation  | Mass<br>m<br>100 piece<br>≈kg | Dimensions |                |     |                |                 |       |    |
|--------------|-------------------------------|------------|----------------|-----|----------------|-----------------|-------|----|
|              |                               | d          | D <sub>s</sub> | s   | D <sub>a</sub> | E <sup>1)</sup> | F     | K  |
| <b>MBL26</b> | 8,7                           | <b>130</b> | 161            | 2   | 145            | 14              | 125   | 12 |
| <b>MB26</b>  | 11,3                          | <b>130</b> | 175            | 2   | 149            | 14              | 125   | 12 |
| <b>MB27</b>  | 14,4                          | <b>135</b> | 185            | 2   | 160            | 14              | 130   | 14 |
| <b>MBL28</b> | 10,9                          | <b>140</b> | 171            | 2   | 155            | 16              | 135   | 12 |
| <b>MB28</b>  | 14,2                          | <b>140</b> | 192            | 2   | 160            | 16              | 135   | 14 |
| <b>MB29</b>  | 16,8                          | <b>145</b> | 202            | 2   | 171            | 16              | 140   | 14 |
| <b>MBL30</b> | 11,3                          | <b>150</b> | 188            | 2   | 170            | 16              | 145   | 14 |
| <b>MB30</b>  | 15,5                          | <b>150</b> | 205            | 2   | 171            | 16              | 145   | 14 |
| <b>MB31</b>  | 20,9                          | <b>155</b> | 212            | 2,5 | 182            | 16              | 147,5 | 16 |
| <b>MBL32</b> | 16,2                          | <b>160</b> | 199            | 2,5 | 180            | 18              | 154   | 14 |
| <b>MB32</b>  | 22,2                          | <b>160</b> | 217            | 2,5 | 182            | 18              | 154   | 16 |
| <b>MB33</b>  | 24,1                          | <b>165</b> | 222            | 2,5 | 193            | 18              | 157,5 | 16 |
| <b>MBL34</b> | 17                            | <b>170</b> | 211            | 2,5 | 190            | 18              | 164   | 16 |
| <b>MB34</b>  | 24,7                          | <b>170</b> | 232            | 2,5 | 193            | 18              | 164   | 16 |
| <b>MBL36</b> | 18                            | <b>180</b> | 221            | 2,5 | 200            | 20              | 174   | 16 |
| <b>MB36</b>  | 26,8                          | <b>180</b> | 242            | 2,5 | 203            | 20              | 174   | 18 |
| <b>MBL38</b> | 20,5                          | <b>190</b> | 231            | 2,5 | 210            | 20              | 184   | 16 |
| <b>MB38</b>  | 27,8                          | <b>190</b> | 252            | 2,5 | 214            | 20              | 184   | 18 |
| <b>MBL40</b> | 21,4                          | <b>200</b> | 248            | 2,5 | 222            | 20              | 194   | 18 |
| <b>MB40</b>  | 29,3                          | <b>200</b> | 262            | 2,5 | 226            | 20              | 194   | 18 |
| <b>MB44</b>  | 40                            | <b>220</b> | 292            | 3   | 250            | 24              | 213   | 20 |
| <b>MB48</b>  | 40                            | <b>240</b> | 312            | 3   | 270            | 24              | 233   | 20 |
| <b>MB52</b>  | 60                            | <b>260</b> | 342            | 3   | 300            | 28              | 253   | 24 |
| <b>MB56</b>  | 62                            | <b>280</b> | 362            | 3   | 320            | 28              | 273   | 24 |

1) The dimension E can be used as a minimum dimension for the slot width in shafts.

# Retaining brackets

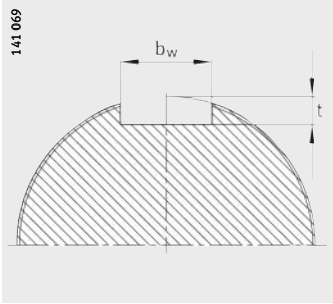
With hexagon head cap screw



**Dimension table** - Dimensions in mm

| Designation                   |   | Tightening torque<br>Nm | Mass<br>m<br>≈kg | Dimensions |                |    |                |      | Mounting dimensions<br>Shaft slot |    |
|-------------------------------|---|-------------------------|------------------|------------|----------------|----|----------------|------|-----------------------------------|----|
| Retaining bracket<br>Complete | Hexagon<br>head cap screw <sup>1)</sup> |                         |                  | s          | b <sub>s</sub> | h  | d <sub>s</sub> | e    | b <sub>w</sub>                    | t  |
| <b>MS3044</b>                 | M6X10                                   | 10                      | 0,026            | 4          | 20             | 12 | 7              | 13,5 | 22                                | 9  |
| <b>MS3144</b>                 | M8X16                                   | 25                      | 0,038            | 4          | 20             | 12 | 9              | 22,5 | 22                                | 9  |
| <b>MS3048</b>                 | M8X16                                   | 25                      | 0,035            | 4          | 20             | 12 | 9              | 17,5 | 22                                | 9  |
| <b>MS3152</b>                 | M10X20                                  | 51                      | 0,056            | 4          | 24             | 12 | 11             | 25,5 | 26                                | 9  |
| <b>MS3056</b>                 | M8X16                                   | 25                      | 0,04             | 4          | 24             | 12 | 9              | 17,5 | 26                                | 9  |
| <b>MS3060</b>                 | M8X16                                   | 25                      | 0,043            | 4          | 24             | 12 | 9              | 20,5 | 26                                | 9  |
| <b>MS3160</b>                 | M10X20                                  | 51                      | 0,059            | 4          | 24             | 12 | 12             | 30,5 | 26                                | 9  |
| <b>MS3064</b>                 | M8X16                                   | 25                      | 0,057            | 5          | 24             | 15 | 9              | 21   | 26                                | 10 |
| <b>MS3164</b>                 | M10X20                                  | 51                      | 0,074            | 5          | 24             | 15 | 12             | 31   | 26                                | 10 |
| <b>MS3168</b>                 | M12X22                                  | 87                      | 0,115            | 5          | 28             | 15 | 14             | 38   | 30                                | 10 |
| <b>MS3072</b>                 | M8X16                                   | 25                      | 0,064            | 5          | 28             | 15 | 9              | 20   | 30                                | 10 |
| <b>MS3076</b>                 | M10X20                                  | 51                      | 0,076            | 5          | 28             | 15 | 12             | 24   | 30                                | 10 |
| <b>MS3176</b>                 | M12X22                                  | 87                      | 0,115            | 5          | 32             | 15 | 14             | 40   | 34                                | 10 |
| <b>MS3180</b>                 | M16X25                                  | 215                     | 0,154            | 5          | 32             | 15 | 18             | 45   | 34                                | 10 |
| <b>MS3084</b>                 | M10X20                                  | 51                      | 0,085            | 5          | 32             | 15 | 12             | 24   | 34                                | 10 |
| <b>MS3088</b>                 | M12X22                                  | 87                      | 0,1              | 5          | 32             | 15 | 14             | 28   | 34                                | 10 |
| <b>MS3188</b>                 | M16X25                                  | 215                     | 0,163            | 5          | 36             | 15 | 18             | 43   | 38                                | 10 |
| <b>MS3096</b>                 | M12X22                                  | 87                      | 0,109            | 5          | 36             | 15 | 14             | 28   | 38                                | 12 |
| <b>MS3196</b>                 | M16X25                                  | 215                     | 0,177            | 5          | 36             | 15 | 18             | 53   | 38                                | 12 |

<sup>1)</sup> Up to thread M16: self-retaining screw.



Shaft

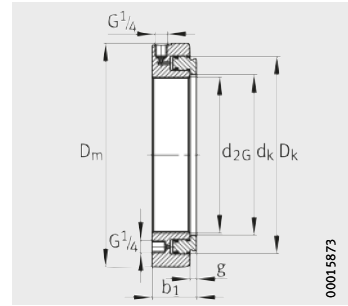
**Dimension table** (continued) - Dimensions in mm

| Designation                   |   | Tightening torque<br>Nm | Mass<br>m<br>≈ kg | Dimensions |                |    |                |    | Mounting dimensions<br>Shaft slot |    |
|-------------------------------|---|-------------------------|-------------------|------------|----------------|----|----------------|----|-----------------------------------|----|
| Retaining bracket<br>Complete | Hexagon<br>head cap screw <sup>1)</sup> |                         |                   | s          | b <sub>s</sub> | h  | d <sub>s</sub> | e  | b <sub>w</sub>                    | t  |
| <b>MS31/500</b>               | M16X25                                  | 215                     | 0,178             | 5          | 40             | 15 | 18             | 45 | 42                                | 12 |
| <b>MS30/530</b>               | M16X25                                  | 215                     | 0,223             | 7          | 40             | 21 | 18             | 34 | 42                                | 14 |
| <b>MS31/530</b>               | M20X40                                  | 430                     | 0,347             | 7          | 40             | 21 | 22             | 51 | 42                                | 14 |
| <b>MS30/560</b>               | M16X25                                  | 215                     | 0,212             | 7          | 40             | 21 | 18             | 29 | 42                                | 14 |
| <b>MS31/560</b>               | M20X40                                  | 430                     | 0,38              | 7          | 45             | 21 | 22             | 54 | 47                                | 14 |
| <b>MS30/630</b>               | M16X25                                  | 215                     | 0,244             | 7          | 45             | 21 | 18             | 34 | 47                                | 14 |
| <b>MS31/630</b>               | M20X40                                  | 430                     | 0,426             | 7          | 50             | 21 | 22             | 61 | 52                                | 14 |
| <b>MS30/670</b>               | M16X25                                  | 215                     | 0,257             | 7          | 45             | 21 | 18             | 39 | 47                                | 14 |
| <b>MS31/670</b>               | M20X40                                  | 430                     | 0,439             | 7          | 50             | 21 | 22             | 66 | 52                                | 15 |
| <b>MS30/710</b>               | M16X25                                  | 215                     | 0,279             | 7          | 50             | 21 | 18             | 39 | 52                                | 15 |
| <b>MS31/710</b>               | M24X45                                  | 740                     | 0,58              | 7          | 55             | 21 | 26             | 69 | 57                                | 15 |
| <b>MS30/750</b>               | M16X25                                  | 215                     | 0,301             | 7          | 55             | 21 | 18             | 39 | 57                                | 15 |
| <b>MS31/750</b>               | M24X45                                  | 740                     | 0,614             | 7          | 60             | 21 | 26             | 70 | 62                                | 15 |
| <b>MS30/850</b>               | M20X40                                  | 430                     | 0,426             | 7          | 60             | 21 | 22             | 44 | 62                                | 15 |
| <b>MS31/850</b>               | M24X45                                  | 740                     | 0,679             | 7          | 70             | 21 | 26             | 71 | 72                                | 16 |
| <b>MS31/900</b>               | M24X45                                  | 740                     | 0,698             | 7          | 70             | 21 | 26             | 76 | 72                                | 16 |
| <b>MS30/950</b>               | M20X40                                  | 430                     | 0,433             | 7          | 60             | 21 | 22             | 46 | 62                                | 16 |
| <b>MS31/950</b>               | M24X45                                  | 740                     | 0,706             | 7          | 70             | 21 | 26             | 78 | 72                                | 16 |
| <b>MS30/1000</b>              | M20X40                                  | 430                     | 0,449             | 7          | 60             | 21 | 22             | 51 | 62                                | 16 |
| <b>MS31/1000</b>              | M24X45                                  | 740                     | 0,744             | 7          | 70             | 21 | 26             | 88 | 72                                | 16 |
| <b>MS30/1500</b>              | M20X40                                  | 430                     | 0,466             | 7          | 60             | 21 | 22             | 56 | 62                                | 16 |

<sup>1)</sup> From thread M20: standardised hexagon head cap screw with retainer.

# Hydraulic nuts

Threads in metric sizes



**Dimension table** - Dimensions in mm

| Designation | Mass<br>m<br>≈kg | Dimensions      |                |                |                |                |    |                  |                                   | Drive-up force<br>at 800 bar<br>kN |
|-------------|------------------|-----------------|----------------|----------------|----------------|----------------|----|------------------|-----------------------------------|------------------------------------|
|             |                  | d <sub>2G</sub> | D <sub>m</sub> | b <sub>1</sub> | D <sub>k</sub> | d <sub>k</sub> | g  | Stroke<br>length | Piston surface<br>cm <sup>2</sup> |                                    |
| HYDNUT150   | 6,8              | <b>M150X2</b>   | 220            | 46             | 191            | 151            | 7  | 5                | 75,3                              | 602                                |
| HYDNUT155   | 7,2              | <b>M155X3</b>   | 225            | 46             | 200            | 156            | 7  | 5                | 81,8                              | 654                                |
| HYDNUT160   | 8                | <b>M160X3</b>   | 235            | 47             | 206            | 161            | 7  | 6                | 87,2                              | 698                                |
| HYDNUT165   | 8,2              | <b>M165X3</b>   | 240            | 47             | 211            | 166            | 7  | 6                | 92,3                              | 739                                |
| HYDNUT170   | 8,6              | <b>M170X3</b>   | 245            | 48             | 216            | 171            | 7  | 6                | 94,7                              | 758                                |
| HYDNUT180   | 9,1              | <b>M180X3</b>   | 255            | 48             | 227            | 181            | 7  | 6                | 103                               | 824                                |
| HYDNUT190   | 10,5             | <b>M190X3</b>   | 270            | 50             | 240            | 191            | 8  | 8                | 116                               | 928                                |
| HYDNUT200   | 11,5             | <b>M200X3</b>   | 280            | 50             | 251            | 201            | 8  | 8                | 125                               | 1 000                              |
| HYDNUT205   | 12,3             | <b>Tr205X4</b>  | 290            | 51             | 258            | 207            | 8  | 8                | 132,2                             | 1 058                              |
| HYDNUT210   | 12,7             | <b>Tr210X4</b>  | 295            | 52             | 263            | 212            | 9  | 9                | 135                               | 1 080                              |
| HYDNUT215   | 13,2             | <b>Tr215X4</b>  | 300            | 53             | 268            | 217            | 9  | 9                | 137,7                             | 1 102                              |
| HYDNUT220   | 13,5             | <b>Tr220X4</b>  | 305            | 53             | 273            | 222            | 9  | 9                | 144,2                             | 1 154                              |
| HYDNUT225   | 15               | <b>Tr225X4</b>  | 315            | 54             | 282            | 227            | 9  | 10               | 153                               | 1 224                              |
| HYDNUT230   | 15,3             | <b>Tr230X4</b>  | 320            | 54             | 287            | 232            | 9  | 10               | 160                               | 1 280                              |
| HYDNUT235   | 15,5             | <b>Tr235X4</b>  | 325            | 54             | 290            | 237            | 9  | 10               | 161,7                             | 1 294                              |
| HYDNUT240   | 16,1             | <b>Tr240X4</b>  | 330            | 55             | 296            | 242            | 9  | 10               | 165,3                             | 1 323                              |
| HYDNUT250   | 18               | <b>Tr250X4</b>  | 345            | 56             | 310            | 252            | 10 | 10               | 182,2                             | 1 458                              |
| HYDNUT260   | 19               | <b>Tr260X4</b>  | 355            | 57             | 319            | 262            | 10 | 11               | 188                               | 1 504                              |
| HYDNUT270   | 21,1             | <b>Tr270X4</b>  | 370            | 58             | 332            | 272            | 10 | 12               | 196                               | 1 568                              |
| HYDNUT275   | 21,5             | <b>Tr275X4</b>  | 375            | 58             | 337            | 277            | 10 | 12               | 204                               | 1 632                              |
| HYDNUT280   | 22,3             | <b>Tr280X4</b>  | 380            | 59             | 342            | 282            | 10 | 12               | 211,7                             | 1 694                              |
| HYDNUT290   | 23,3             | <b>Tr290X4</b>  | 390            | 60             | 352            | 292            | 10 | 13               | 218,3                             | 1 747                              |
| HYDNUT295   | 25               | <b>Tr295X4</b>  | 400            | 60             | 362            | 297            | 10 | 13               | 230                               | 1 840                              |
| HYDNUT300   | 25,8             | <b>Tr300X4</b>  | 405            | 61             | 365            | 302            | 10 | 13               | 237                               | 1 896                              |
| HYDNUT310   | 27               | <b>Tr310X5</b>  | 415            | 62             | 375            | 312            | 10 | 13               | 249                               | 1 992                              |
| HYDNUT315   | 27,5             | <b>Tr315X5</b>  | 420            | 62             | 380            | 317            | 10 | 13               | 252,5                             | 2 020                              |
| HYDNUT320   | 29,9             | <b>Tr320X5</b>  | 430            | 63             | 389            | 322            | 10 | 14               | 264                               | 2 112                              |
| HYDNUT330   | 31               | <b>Tr330X5</b>  | 440            | 64             | 398            | 332            | 11 | 14               | 270,8                             | 2 166                              |
| HYDNUT335   | 32               | <b>Tr335X5</b>  | 445            | 65             | 403            | 337            | 11 | 14               | 275                               | 2 200                              |
| HYDNUT340   | 32,5             | <b>Tr340X5</b>  | 450            | 65             | 408            | 342            | 11 | 14               | 284                               | 2 272                              |
| HYDNUT345   | 33,5             | <b>Tr345X5</b>  | 455            | 66             | 413            | 347            | 11 | 14               | 288                               | 2 304                              |
| HYDNUT350   | 35               | <b>Tr350X5</b>  | 465            | 66             | 422            | 352            | 11 | 14               | 306                               | 2 448                              |
| HYDNUT355   | 36,5             | <b>Tr355X5</b>  | 470            | 67             | 427            | 357            | 11 | 15               | 304                               | 2 432                              |

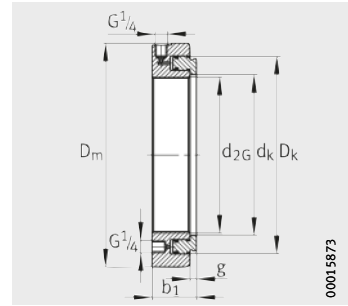


**Dimension table (continued) - Dimensions in mm**

| Designation      | Mass<br>m<br>≈kg | Dimensions      |                |                |                |                |    |                  |                                   | Drive-up force<br>at 800 bar<br>kN |
|------------------|------------------|-----------------|----------------|----------------|----------------|----------------|----|------------------|-----------------------------------|------------------------------------|
|                  |                  | d <sub>2G</sub> | D <sub>m</sub> | b <sub>1</sub> | D <sub>k</sub> | d <sub>k</sub> | g  | Stroke<br>length | Piston surface<br>cm <sup>2</sup> |                                    |
| <b>HYDNUT360</b> | 37               | <b>Tr360X5</b>  | 475            | 67             | 431            | 362            | 11 | 15               | 313                               | 2 504                              |
| <b>HYDNUT365</b> | 38               | <b>Tr365X5</b>  | 482            | 67             | 436            | 367            | 11 | 15               | 317                               | 2 536                              |
| <b>HYDNUT370</b> | 40               | <b>Tr370X5</b>  | 490            | 68             | 444            | 372            | 11 | 16               | 323                               | 2 584                              |
| <b>HYDNUT375</b> | 41               | <b>Tr375X5</b>  | 495            | 68             | 450            | 377            | 11 | 16               | 334                               | 2 672                              |
| <b>HYDNUT380</b> | 41,5             | <b>Tr380X5</b>  | 500            | 69             | 454            | 382            | 11 | 16               | 337                               | 2 696                              |
| <b>HYDNUT385</b> | 42               | <b>Tr385X5</b>  | 505            | 69             | 460            | 387            | 11 | 16               | 348                               | 2 784                              |
| <b>HYDNUT395</b> | 43               | <b>Tr395X5</b>  | 512            | 69             | 470            | 397            | 11 | 16               | 356                               | 2 848                              |
| <b>HYDNUT400</b> | 47               | <b>Tr400X5</b>  | 525            | 71             | 477            | 402            | 11 | 17               | 368                               | 2 944                              |
| <b>HYDNUT410</b> | 48               | <b>Tr410X5</b>  | 535            | 71             | 485            | 412            | 11 | 17               | 382                               | 3 056                              |
| <b>HYDNUT415</b> | 49               | <b>Tr415X5</b>  | 540            | 71             | 490            | 417            | 11 | 17               | 386                               | 3 088                              |
| <b>HYDNUT420</b> | 50               | <b>Tr420X5</b>  | 545            | 72             | 495            | 422            | 12 | 17               | 390                               | 3 120                              |
| <b>HYDNUT430</b> | 52               | <b>Tr430X5</b>  | 555            | 74             | 505            | 432            | 12 | 17               | 398                               | 3 184                              |
| <b>HYDNUT435</b> | 53               | <b>Tr435X5</b>  | 560            | 74             | 510            | 437            | 12 | 17               | 403                               | 3 224                              |
| <b>HYDNUT440</b> | 54               | <b>Tr440X5</b>  | 565            | 74             | 519            | 442            | 12 | 17               | 425                               | 3 400                              |
| <b>HYDNUT450</b> | 58               | <b>Tr450X5</b>  | 580            | 76             | 530            | 452            | 12 | 17               | 442                               | 3 536                              |
| <b>HYDNUT460</b> | 59,5             | <b>Tr460X5</b>  | 590            | 76             | 540            | 462            | 12 | 18               | 450                               | 3 600                              |
| <b>HYDNUT470</b> | 61               | <b>Tr470X5</b>  | 600            | 76             | 550            | 472            | 12 | 18               | 459                               | 3 672                              |
| <b>HYDNUT480</b> | 63               | <b>Tr480X5</b>  | 612            | 76             | 560            | 482            | 12 | 18               | 460                               | 3 680                              |
| <b>HYDNUT490</b> | 69               | <b>Tr490X5</b>  | 625            | 80             | 575            | 492            | 13 | 19               | 506                               | 4 048                              |
| <b>HYDNUT500</b> | 70               | <b>Tr500X5</b>  | 635            | 80             | 585            | 502            | 13 | 20               | 523                               | 4 185                              |
| <b>HYDNUT510</b> | 72               | <b>Tr510X6</b>  | 645            | 80             | 595            | 512            | 13 | 20               | 533                               | 4 264                              |
| <b>HYDNUT520</b> | 75               | <b>Tr520X6</b>  | 657            | 80             | 605            | 522            | 13 | 21               | 542                               | 4 336                              |
| <b>HYDNUT530</b> | 80               | <b>Tr530X6</b>  | 670            | 83             | 617            | 532            | 13 | 22               | 562                               | 4 496                              |
| <b>HYDNUT540</b> | 82,5             | <b>Tr540X6</b>  | 680            | 83             | 628            | 542            | 13 | 22               | 581                               | 4 648                              |
| <b>HYDNUT550</b> | 84,5             | <b>Tr550X6</b>  | 692            | 83             | 639            | 552            | 13 | 22               | 592                               | 4 736                              |
| <b>HYDNUT560</b> | 88               | <b>Tr560X6</b>  | 705            | 83             | 650            | 562            | 13 | 22               | 612                               | 4 896                              |
| <b>HYDNUT570</b> | 92               | <b>Tr570X6</b>  | 715            | 85             | 660            | 572            | 13 | 23               | 631                               | 5 048                              |
| <b>HYDNUT580</b> | 93               | <b>Tr580X6</b>  | 725            | 85             | 670            | 582            | 13 | 23               | 641                               | 5 128                              |
| <b>HYDNUT590</b> | 98               | <b>Tr590X6</b>  | 740            | 85             | 685            | 592            | 13 | 23               | 666                               | 5 328                              |
| <b>HYDNUT600</b> | 100              | <b>Tr600X6</b>  | 750            | 85             | 695            | 603            | 13 | 23               | 677                               | 5 416                              |
| <b>HYDNUT610</b> | 104              | <b>Tr610X6</b>  | 760            | 88             | 705            | 613            | 14 | 24               | 687                               | 5 496                              |
| <b>HYDNUT625</b> | 107              | <b>Tr625X6</b>  | 775            | 88             | 720            | 628            | 14 | 24               | 702                               | 5 516                              |
| <b>HYDNUT630</b> | 109              | <b>Tr630X6</b>  | 780            | 88             | 725            | 633            | 14 | 24               | 728                               | 5 824                              |

# Hydraulic nuts

Threads in metric sizes

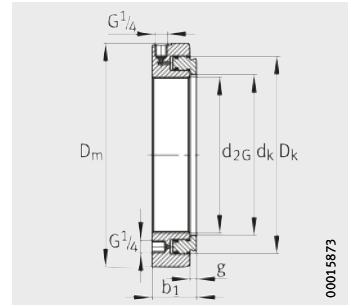


| Dimension table (continued) · Dimensions in mm |                  |                 |                |                |                |                |    |                  |                                   |                                    |
|--|------------------|-----------------|----------------|----------------|----------------|----------------|----|------------------|-----------------------------------|------------------------------------|
| Designation                                    | Mass<br>m<br>≈kg | Dimensions      |                |                |                |                |    |                  |                                   | Drive-up force<br>at 800 bar<br>kN |
|  |                  | d <sub>2G</sub> | D <sub>m</sub> | b <sub>1</sub> | D <sub>k</sub> | d <sub>k</sub> | g  | Stroke<br>length | Piston surface<br>cm <sup>2</sup> |                                    |
| HYDNUT650                                      | 115              | Tr650X6         | 805            | 88             | 748            | 653            | 14 | 24               | 763                               | 6 104                              |
| HYDNUT655                                      | 116              | Tr655X6         | 810            | 88             | 753            | 658            | 14 | 24               | 768                               | 6 144                              |
| HYDNUT670                                      | 121              | Tr670X6         | 825            | 90             | 768            | 673            | 14 | 24               | 795                               | 6 360                              |
| HYDNUT680                                      | 124              | Tr680X6         | 837            | 90             | 780            | 683            | 14 | 24               | 819                               | 6 552                              |
| HYDNUT690                                      | 128              | Tr690X6         | 850            | 90             | 792            | 693            | 14 | 25               | 844                               | 6 752                              |
| HYDNUT695                                      | 133              | Tr695X6         | 855            | 93             | 798            | 698            | 14 | 25               | 862                               | 6 896                              |
| HYDNUT710                                      | 136              | Tr710X7         | 870            | 93             | 812            | 713            | 14 | 25               | 877                               | 7 020                              |
| HYDNUT720                                      | 144              | Tr720X7         | 883            | 95             | 825            | 723            | 15 | 25               | 928                               | 7 424                              |
| HYDNUT740                                      | 154              | Tr740X7         | 910            | 95             | 848            | 743            | 15 | 25               | 991                               | 7 928                              |
| HYDNUT750                                      | 160              | Tr750X7         | 922            | 96             | 862            | 753            | 15 | 26               | 1033                              | 8 265                              |
| HYDNUT760                                      | 165              | Tr760X7         | 935            | 96             | 872            | 763            | 15 | 26               | 1045                              | 8 360                              |
| HYDNUT780                                      | 172              | Tr780X7         | 955            | 98             | 890            | 783            | 15 | 28               | 1068                              | 8 544                              |
| HYDNUT800                                      | 170              | Tr800X7         | 970            | 98             | 909            | 803            | 16 | 28               | 1079                              | 8 632                              |
| HYDNUT830                                      | 176              | Tr830X7         | 1 000          | 98             | 938            | 833            | 16 | 29               | 1 101                             | 8 808                              |
| HYDNUT850                                      | 180              | Tr850X7         | 1 020          | 98             | 960            | 853            | 16 | 29               | 1 156                             | 9 248                              |
| HYDNUT880                                      | 185              | Tr880X7         | 1 050          | 98             | 988            | 883            | 16 | 29               | 1 148                             | 9 184                              |
| HYDNUT900                                      | 194              | Tr900X7         | 1 070          | 100            | 1 012          | 903            | 16 | 29               | 1 251                             | 10 008                             |
| HYDNUT930                                      | 200              | Tr930X8         | 1 100          | 100            | 1 042          | 933            | 16 | 30               | 1 290                             | 10 320                             |
| HYDNUT950                                      | 210              | Tr950X8         | 1 120          | 100            | 1 065          | 953            | 16 | 30               | 1 365                             | 10 920                             |
| HYDNUT1000                                     | 228              | Tr1000X8        | 1 170          | 100            | 1 123          | 1 003          | 16 | 30               | 1 490                             | 11 920                             |
| HYDNUT1060                                     | 300              | Tr1060X8        | 1 255          | 115            | 1 185          | 1 063          | 18 | 32               | 1 610                             | 12 880                             |
| HYDNUT1080                                     | 322              | Tr1080X8        | 1 280          | 118            | 1 207          | 1 083          | 18 | 33               | 1 680                             | 13 440                             |
| HYDNUT1120                                     | 392              | Tr1120X8        | 1 340          | 125            | 1 260          | 1 123          | 19 | 36               | 1 900                             | 15 200                             |
| HYDNUT1180                                     | 503              | Tr1180X8        | 1 430          | 135            | 1 315          | 1 183          | 22 | 39               | 2 100                             | 16 800                             |



# Hydraulic nuts

Threads in inch sizes



**Dimension table** - Dimensions in mm

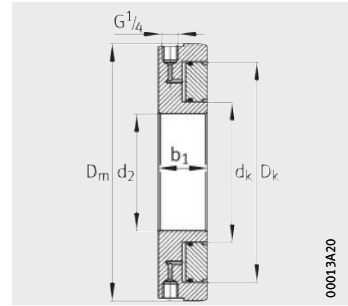
| Designation    | Mass<br>m<br>≈kg | Thread<br>d <sub>2G</sub> |               | Flank diameter |         | Number of turns per inch |
|----------------|------------------|---------------------------|---------------|----------------|---------|--------------------------|
|                |                  | mm                        | inch          | mm             | inch    |                          |
| HYDNUT150-INCH | 6,8              | <b>149,555</b>            | <b>5,888</b>  | 148,181        | 5,8339  | 12                       |
| HYDNUT160-INCH | 8                | <b>159,614</b>            | <b>6,284</b>  | 157,551        | 6,2028  | 8                        |
| HYDNUT170-INCH | 8,6              | <b>169,139</b>            | <b>6,659</b>  | 167,067        | 6,5778  | 8                        |
| HYDNUT180-INCH | 8,1              | <b>179,476</b>            | <b>7,066</b>  | 177,414        | 6,9848  | 8                        |
| HYDNUT190-INCH | 10,5             | <b>189,789</b>            | <b>7,472</b>  | 187,726        | 7,3908  | 8                        |
| HYDNUT200-INCH | 11,5             | <b>199,314</b>            | <b>7,847</b>  | 197,251        | 7,7658  | 8                        |
| HYDNUT220-INCH | 13,5             | <b>219,151</b>            | <b>8,628</b>  | 217,089        | 8,5468  | 8                        |
| HYDNUT240-INCH | 16,1             | <b>239,827</b>            | <b>9,442</b>  | 237,076        | 9,3337  | 6                        |
| HYDNUT260-INCH | 19               | <b>258,877</b>            | <b>10,192</b> | 256,126        | 10,0837 | 6                        |
| HYDNUT280-INCH | 22,3             | <b>279,502</b>            | <b>11,004</b> | 276,751        | 10,8975 | 6                        |
| HYDNUT300-INCH | 25,8             | <b>299,339</b>            | <b>11,785</b> | 296,588        | 11,6767 | 6                        |
| HYDNUT320-INCH | 29,9             | <b>319,075</b>            | <b>12,562</b> | 316,324        | 12,4537 | 6                        |
| HYDNUT340-INCH | 32,5             | <b>338,811</b>            | <b>13,339</b> | 335,763        | 13,219  | 5                        |
| HYDNUT360-INCH | 37               | <b>359,918</b>            | <b>14,17</b>  | 356,87         | 14,05   | 5                        |
| HYDNUT380-INCH | 41,5             | <b>379,908</b>            | <b>14,957</b> | 376,86         | 14,837  | 5                        |
| HYDNUT400-INCH | 47               | <b>399,923</b>            | <b>15,745</b> | 396,875        | 15,625  | 5                        |
| HYDNUT420-INCH | 50               | <b>419,913</b>            | <b>16,532</b> | 416,865        | 16,412  | 5                        |
| HYDNUT440-INCH | 54               | <b>439,903</b>            | <b>17,319</b> | 436,855        | 17,199  | 5                        |
| HYDNUT460-INCH | 59,5             | <b>459,918</b>            | <b>18,107</b> | 456,87         | 17,987  | 5                        |
| HYDNUT480-INCH | 63               | <b>479,908</b>            | <b>18,894</b> | 476,86         | 18,774  | 5                        |
| HYDNUT500-INCH | 70               | <b>499,923</b>            | <b>19,682</b> | 496,875        | 19,562  | 5                        |
| HYDNUT530-INCH | 80               | <b>530,022</b>            | <b>20,867</b> | 526,339        | 20,722  | 4                        |

| Dimensions     |                |                |                |    |               |                                   | Drive-up force<br>at 800 bar<br>kN |
|----------------|----------------|----------------|----------------|----|---------------|-----------------------------------|------------------------------------|
| D <sub>m</sub> | b <sub>1</sub> | D <sub>k</sub> | d <sub>k</sub> | g  | Stroke length | Piston surface<br>cm <sup>2</sup> |                                    |
| 220            | 46             | 191            | 151            | 7  | 5             | 75,3                              | 602                                |
| 235            | 47             | 206            | 161            | 7  | 6             | 87,2                              | 698                                |
| 245            | 48             | 216            | 171            | 7  | 6             | 94,7                              | 758                                |
| 255            | 48             | 227            | 181            | 7  | 6             | 103                               | 824                                |
| 270            | 50             | 240            | 191            | 8  | 8             | 116                               | 928                                |
| 280            | 50             | 251            | 201            | 8  | 8             | 125                               | 1 000                              |
| 305            | 53             | 273            | 222            | 9  | 9             | 144,2                             | 1 154                              |
| 330            | 55             | 296            | 242            | 9  | 10            | 165,3                             | 1 323                              |
| 355            | 57             | 319            | 262            | 10 | 11            | 188                               | 1 504                              |
| 380            | 59             | 342            | 282            | 10 | 12            | 211,7                             | 1 694                              |
| 405            | 61             | 365            | 302            | 10 | 13            | 237                               | 1 896                              |
| 430            | 63             | 389            | 322            | 10 | 14            | 264                               | 2 112                              |
| 450            | 65             | 408            | 342            | 11 | 14            | 284                               | 2 272                              |
| 475            | 67             | 431            | 362            | 11 | 15            | 313                               | 2 504                              |
| 500            | 69             | 454            | 382            | 11 | 16            | 337                               | 2 696                              |
| 525            | 71             | 477            | 402            | 11 | 17            | 368                               | 2 944                              |
| 545            | 72             | 495            | 422            | 11 | 17            | 390                               | 3 120                              |
| 565            | 74             | 519            | 442            | 12 | 17            | 425                               | 3 400                              |
| 590            | 76             | 540            | 462            | 12 | 18            | 450                               | 3 600                              |
| 612            | 76             | 560            | 482            | 12 | 18            | 460                               | 3 680                              |
| 635            | 80             | 585            | 502            | 13 | 20            | 523                               | 4 185                              |
| 670            | 83             | 617            | 542            | 13 | 22            | 562                               | 4 496                              |



# Hydraulic nuts

Increased capacity design



00013A20

**Dimension table** - Dimensions in mm

| Designation     | Mass<br>m<br>≈kg | Dimensions           |                |                |                |                |                  |                                   | Drive-up force<br>at 800 bar<br>kN |
|-----------------|------------------|----------------------|----------------|----------------|----------------|----------------|------------------|-----------------------------------|------------------------------------|
|                 |                  | d <sub>2</sub><br>H7 | D <sub>m</sub> | b <sub>1</sub> | D <sub>k</sub> | d <sub>k</sub> | Stroke<br>length | Piston surface<br>cm <sup>2</sup> |                                    |
| HYDNUT150-HEAVY | 12,5             | <b>150</b>           | 270            | 40             | 226            | 180            | 10               | 147                               | 1 170                              |
| HYDNUT175-HEAVY | 17               | <b>175</b>           | 305            | 45             | 250            | 205            | 11               | 161                               | 1 280                              |
| HYDNUT200-HEAVY | 21               | <b>200</b>           | 330            | 50             | 280            | 230            | 12               | 200                               | 1 600                              |
| HYDNUT225-HEAVY | 23               | <b>225</b>           | 365            | 50             | 313            | 255            | 12               | 259                               | 2 070                              |
| HYDNUT250-HEAVY | 28               | <b>250</b>           | 390            | 50             | 345            | 280            | 12               | 319                               | 2 550                              |
| HYDNUT275-HEAVY | 34               | <b>275</b>           | 430            | 50             | 380            | 305            | 12               | 403                               | 3 220                              |
| HYDNUT300-HEAVY | 44               | <b>300</b>           | 470            | 55             | 410            | 335            | 13               | 439                               | 3 510                              |
| HYDNUT325-HEAVY | 49               | <b>325</b>           | 500            | 55             | 440            | 360            | 13               | 503                               | 4 020                              |
| HYDNUT350-HEAVY | 57               | <b>350</b>           | 540            | 55             | 475            | 385            | 13               | 608                               | 4 860                              |
| HYDNUT375-HEAVY | 65               | <b>375</b>           | 575            | 55             | 510            | 410            | 13               | 723                               | 5 780                              |
| HYDNUT400-HEAVY | 83               | <b>400</b>           | 620            | 60             | 545            | 440            | 15               | 812                               | 6 500                              |
| HYDNUT425-HEAVY | 90               | <b>425</b>           | 650            | 60             | 575            | 465            | 15               | 899                               | 7 190                              |
| HYDNUT450-HEAVY | 100              | <b>450</b>           | 690            | 65             | 610            | 490            | 17               | 1037                              | 8 290                              |
| HYDNUT475-HEAVY | 120              | <b>475</b>           | 725            | 65             | 642            | 515            | 17               | 1154                              | 9 230                              |
| HYDNUT500-HEAVY | 142              | <b>500</b>           | 760            | 70             | 675            | 540            | 20               | 1288                              | 10 300                             |
| HYDNUT525-HEAVY | 158              | <b>525</b>           | 800            | 70             | 710            | 565            | 20               | 1452                              | 11 620                             |
| HYDNUT550-HEAVY | 183              | <b>550</b>           | 835            | 75             | 742            | 590            | 22               | 1590                              | 12 720                             |
| HYDNUT575-HEAVY | 197              | <b>575</b>           | 870            | 75             | 775            | 615            | 22               | 1747                              | 13 980                             |
| HYDNUT600-HEAVY | 230              | <b>600</b>           | 910            | 80             | 808            | 645            | 25               | 1860                              | 14 880                             |
| HYDNUT625-HEAVY | 248              | <b>625</b>           | 945            | 80             | 840            | 670            | 25               | 2016                              | 16 130                             |
| HYDNUT650-HEAVY | 282              | <b>650</b>           | 980            | 85             | 875            | 695            | 28               | 2220                              | 17 760                             |
| HYDNUT675-HEAVY | 307              | <b>675</b>           | 1020           | 85             | 906            | 720            | 28               | 2375                              | 19 000                             |
| HYDNUT700-HEAVY | 351              | <b>700</b>           | 1060           | 90             | 940            | 750            | 30               | 2522                              | 20 180                             |
| HYDNUT750-HEAVY | 431              | <b>750</b>           | 1130           | 95             | 1007           | 800            | 32               | 2938                              | 23 500                             |
| HYDNUT800-HEAVY | 500              | <b>800</b>           | 1205           | 100            | 1070           | 855            | 35               | 3250                              | 26 000                             |
| HYDNUT850-HEAVY | 583              | <b>850</b>           | 1275           | 105            | 1135           | 905            | 38               | 3685                              | 29 480                             |
| HYDNUT900-HEAVY | 688              | <b>900</b>           | 1350           | 110            | 1200           | 960            | 40               | 4072                              | 32 580                             |



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## Arcanol rolling bearing greases



# Arcanol rolling bearing greases

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# Product overview Arcanol rolling bearing greases

## Arcanol greases



# Arcanol rolling bearing greases

**Features** Schaeffler developed the range of Arcanol rolling bearing greases from a large number of lubricants. These greases offer very good preconditions for favourable running behaviour of bearings and a long life and high operational reliability of the bearing arrangement.

The areas of application of Arcanol greases were determined under widely differing operating conditions and with rolling bearings of all types by means of modern testing methods and testing systems.

**Graduated range** The range is graduated such that almost all areas of application can be covered to an optimum extent.

**For automatic or manual grease lubrication** For grease lubrication, we supply automatic lubricators of the designs CHAMPION and CONCEPT8, filled with Arcanol greases from FAG.

For manual lubrication, we supply a grease gun, comprising a manual grease gun ARCA-GREASE-GUN and the matching armoured hose ARCA-GREASE-GUN.HOSE.

**Containers** Arcanol rolling bearing greases are available in tubes, cartridges, cans, buckets, hobbocks and drums. The following table shows which grease grades are supplied in which containers.

## Grease container sizes

| Arcanol grease <sup>1)</sup> | Tube |      |       | Cartridge<br>400 g | Can<br>1 kg | Bucket |       | Hobbock |       | Drum<br>180 kg |
|------------------------------|------|------|-------|--------------------|-------------|--------|-------|---------|-------|----------------|
|                              | 20 g | 70 g | 250 g |                    |             | 5 kg   | 10 kg | 25 kg   | 50 kg |                |
| MULTITOP                     | -    | -    | ●     | ●                  | ●           | ●      | ●     | ●       | -     | ●              |
| MULTI3                       | -    | -    | ●     | ●                  | ●           | ●      | ●     | ●       | -     | ●              |
| LOAD150                      | -    | -    | -     | ●                  | ●           | -      | ●     | -       | -     | -              |
| LOAD220                      | -    | -    | -     | -                  | ●           | -      | ●     | ●       | -     | ●              |
| LOAD400                      | -    | -    | -     | ●                  | ●           | ●      | ●     | ●       | ●     | ●              |
| LOAD1000                     | -    | -    | -     | -                  | -           | ●      | -     | ●       | -     | ●              |
| TEMP90                       | ●    | -    | -     | ●                  | ●           | ●      | -     | ●       | -     | ●              |
| TEMP110                      | -    | -    | -     | ●                  | ●           | -      | -     | -       | ●     | -              |
| TEMP120                      | -    | -    | -     | -                  | ●           | ●      | -     | ●       | -     | -              |
| TEMP200                      | -    | ●    | -     | -                  | ●           | -      | -     | -       | -     | -              |
| SPEED2,6                     | -    | -    | ●     | -                  | ●           | -      | -     | ●       | -     | -              |
| VIB3                         | -    | -    | -     | ●                  | ●           | ●      | -     | ●       | ●     | -              |
| BIO2                         | -    | -    | -     | ●                  | ●           | -      | ●     | ●       | -     | ●              |
| FOOD2                        | -    | -    | -     | ●                  | ●           | -      | ●     | ●       | -     | ●              |

<sup>1)</sup> Other containers are available by agreement.



# Arcanol rolling bearing greases

## Arcanol greases

The chemical/physical characteristics of the greases, their principal characteristics and application examples are shown in the table. Ordering examples for the greases are listed below.

### Arcanol rolling bearing greases

| Arcanol grease  | Designation to DIN 51825 | Classification   |
|-----------------|--------------------------|--|
| <b>MULTI2</b>   | KP2K-30                  | Low-noise ball bearing grease for $D \leq 62$ mm   |
| <b>MULTI3</b>   | K3K-20                   | Standard ball bearing/insert bearing grease for $D > 62$ mm                                |
| <b>SPEED2,6</b> | KPHC2/3K-40              | Standard spindle bearing grease  |
| <b>MULTITOP</b> | KPHC2N-40                | Universal high performance grease  |
| <b>TEMP90</b>   | KP3P-40                  | Low-noise rolling bearing grease, up to 160 °C   |
| <b>TEMP110</b>  | KP2P-30                  | Universal grease for higher temperatures   |
| <b>TEMP120</b>  | KPHC2R-30                | Grease for high temperatures and high loads  |
| <b>TEMP200</b>  | KFKP2U-30                | Rolling bearing grease for $T > 150$ °C to 260 °C  |
| <b>LOAD150</b>  | KP2N-20                  | Multi-purpose grease for automotive applications, high performance grease for line contact |
| <b>LOAD220</b>  | KP2N-20                  | Heavy duty grease, wide speed range  |
| <b>LOAD400</b>  | KP2K-20                  | Grease for high loads, shocks  |
| <b>LOAD460</b>  | KP1K-30                  | Grease for high loads, vibrations, low temperatures  |
| <b>LOAD1000</b> | KP2K-20                  | Grease for high loads, shocks, large bearings  |
| <b>FOOD2</b>    | KPHC2K-30                | Grease with foodstuffs approval  |
| <b>VIB3</b>     | KP3N-30                  | Grease for oscillating motion  |
| <b>BIO2</b>     | KPE2N-40                 | Grease with rapid biodegradability   |
| <b>CLEAN-M</b>  | KX2R-30                  | Clean room grease, grease resistant to radiation   |
| <b>MOTION2</b>  | KPFHC2K-40               | High performance grease paste for oscillating applications and plain bearing arrangements  |

| Type of grease<br>Thickener<br>Base oil         | Operating<br>temperature<br>range<br><br>°C | Upper<br>continuous<br>limit<br>temperature<br>$T_{upperlimit}$<br><br>°C | NLGI<br>grade | Speed<br>parameter<br>$n \cdot d_M$<br><br>$\text{min}^{-1} \cdot \text{mm}$ | Kinematic viscosity                |                                     |
|---|---|---|---------------|--|------------------------------------|-------------------------------------|
|   |   |   |               |  | at 40 °C<br>$\text{mm}^2/\text{s}$ | at 100 °C<br>$\text{mm}^2/\text{s}$ |
| Lithium soap<br>Mineral oil                     | -30 to +120                                 | +75   | 2             | 500 000  | 110                                | 11                                  |
| Lithium soap<br>Mineral oil                     | -20 to +120                                 | +75   | 3             | 500 000  | 110                                | 12                                  |
| Lithium soap<br>Synthetic oil                   | -40 to +120                                 | +80   | 2 to 3        | 2 000 000  | 25                                 | 6                                   |
| Lithium soap<br>Partially synthetic oil         | -40 to +140                                 | +80   | 2             | 800 000  | 82                                 | 12,5                                |
| Polycarbamide<br>Partially synthetic oil        | -40 to +160                                 | +90   | 3             | 700 000  | 148                                | 15,5                                |
| Lithium complex soap<br>Partially synthetic oil | -30 to +160                                 | +110  | 2             | 500 000  | 130                                | 14,2                                |
| Polycarbamide<br>Synthetic oil                  | -30 to +180                                 | +120  | 2             | 300 000  | 400                                | 40                                  |
| PTFE<br>Perfluoropolyether oil                  | -30 to +260                                 | +200  | 2             | 300 000  | 550                                | 49                                  |
| Lithium complex soap<br>Mineral oil             | -20 to +140                                 | +95   | 2             | 500 000  | 160                                | 15,5                                |
| Lithium/calcium soap<br>Mineral oil             | -20 to +140                                 | +80   | 2             | 500 000  | 245                                | 20                                  |
| Lithium/calcium soap<br>Mineral oil             | -20 to +120                                 | +80   | 2             | 400 000  | 400                                | 27                                  |
| Lithium/calcium soap<br>Mineral oil             | -30 to +130                                 | +80   | 1             | 400 000  | 400                                | 25                                  |
| Lithium/calcium soap<br>Mineral oil             | -20 to +130                                 | +80   | 2             | 300 000  | 1 000                              | 38                                  |
| Aluminium complex soap<br>White oil             | -30 to +120                                 | +70   | 2             | 400 000  | 150                                | 18                                  |
| Lithium complex soap<br>Mineral oil             | -30 to +150                                 | +90   | 3             | 350 000  | 170                                | 14                                  |
| Lithium/calcium soap<br>Synthetic oil           | -40 to +150                                 | +80   | 2             | 300 000  | 55                                 | 10                                  |
| Polycarbamide<br>Ether                          | -30 to +180                                 | +90   | 2             | 850 000  | 103                                | 12,8                                |
| Lithium soap<br>Synthetic oil                   | -40 to +130                                 | +75   | 2             | 500 000  | 50                                 | 8                                   |







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## Other products

Slewing rings  
High precision bearings for combined loads  
Thin section bearings  
Needle roller bearings with ribs  
Equipment and services  
for the mounting and maintenance of rolling bearings





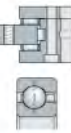
## Slewing rings

Four point contact bearings  
Crossed roller bearings



# Slewing rings

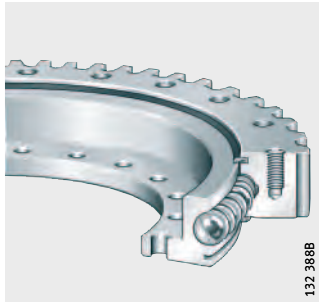
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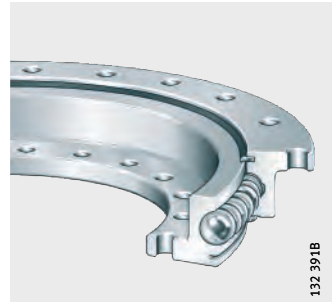
# Product overview Slewing rings

## Four point contact bearings Light series 20

VLA20

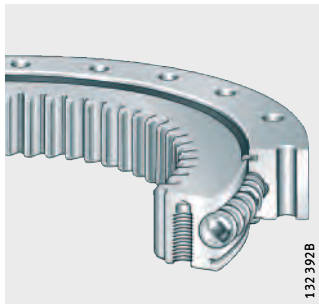


VLU20

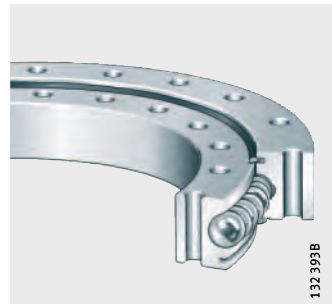


## Standard series 20, 25

VSI20, VSI25

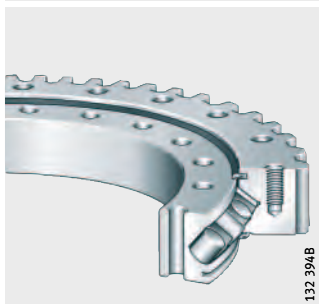


VSU20, VSU25

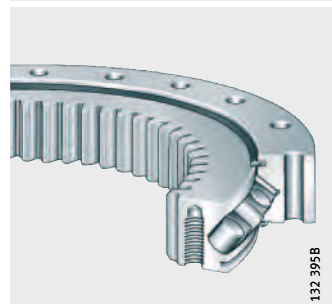


## Crossed roller bearings Standard series 14

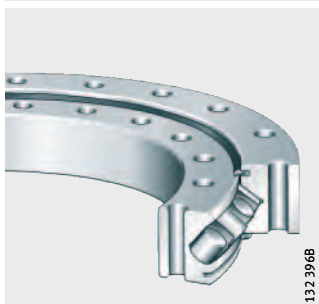
XSA14



XSI14



XSU14



# Slewing rings

**Features** INA slewing rings are known worldwide as premium products in the field of rolling bearing technology. These machine elements have proved themselves many times over; they have high load carrying capacity, a versatile range of applications and are highly cost-effective. Due to their design, a single bearing can reliably support radial, axial and tilting moment loads. It is therefore possible in many cases to replace bearing arrangements comprising a combination of radial and axial bearings by a single bearing. This reduces, in some cases considerably, the costs and work required in the design of the adjacent construction and the mounting of bearings.

Slewing rings are sealed on both sides, lubricated with a high quality grease, can be relubricated via lubrication nipples and give particularly easy mounting. The bearing rings are supplied without gear teeth or, in order to achieve simple drive solutions, are available with external or internal gear teeth.

INA slewing rings are designed as four point contact bearings and crossed roller bearings.

## Four point contact bearings

Four point contact bearings are available with external teeth, internal teeth or without teeth as well as in the light series 20 and standard series 20 and 25.

These slewing rings without preload are robust and proven under very demanding operation; they place only slight demands on the flatness and perpendicularity of the adjacent construction.

They are suitable for applications with lower requirements for accuracy and rigidity of the bearing arrangement, for example in simple metalworking machines, wind power equipment and construction machinery.

## Crossed roller bearings

Crossed roller bearings are available with external teeth, internal teeth and without teeth in the standard series 14 as well as the series XA, XI and XU.

These preloaded slewing rings can support higher loads than four point contact bearings. They have proved themselves particularly effective where bearings are subjected to high radial forces as well as to moderate axial and tilting moment loads.

They are suitable for applications with uniform running free from stick-slip, low rotational resistance and high requirements for axial and radial runout accuracy and rigidity, for example in robots, handling systems and machine tools.

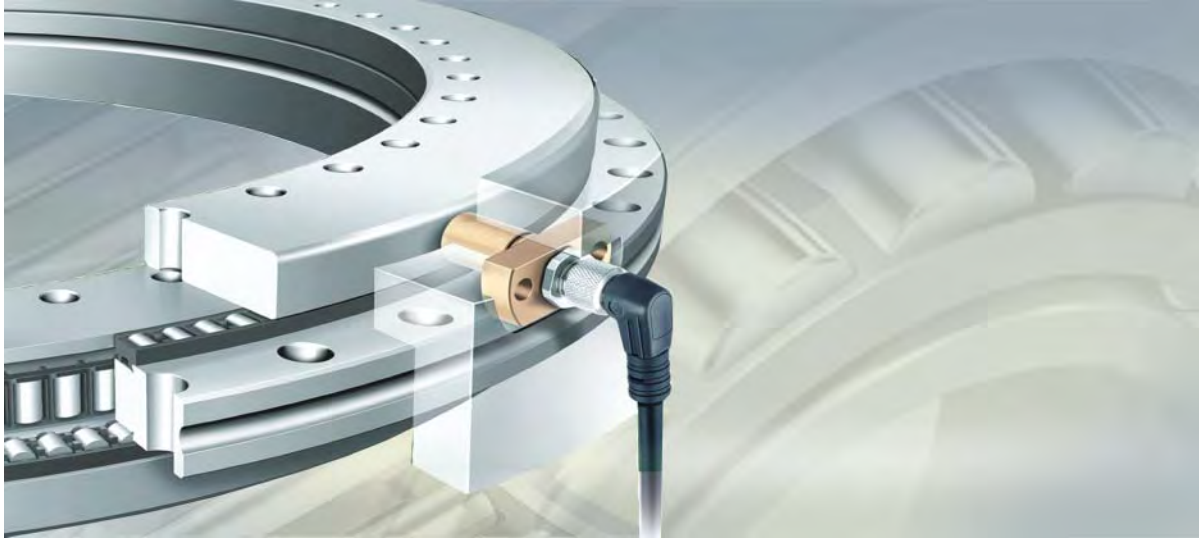
## Product catalogue

The standard range is described comprehensively in Catalogue 404 and the online version of *medias<sup>®</sup> professional*.





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## High precision bearings for combined loads

Axial/radial bearings

Axial angular contact ball bearings

Axial/radial bearings with integral angular measuring system

# High precision bearings for combined loads

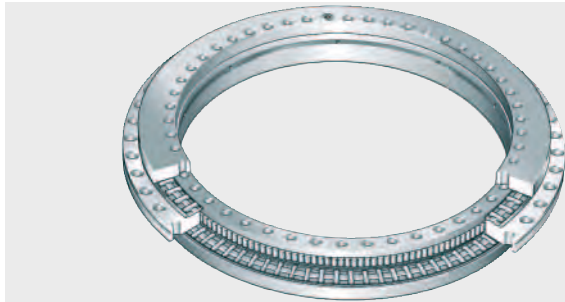
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# Product overview High precision bearings for combined loads

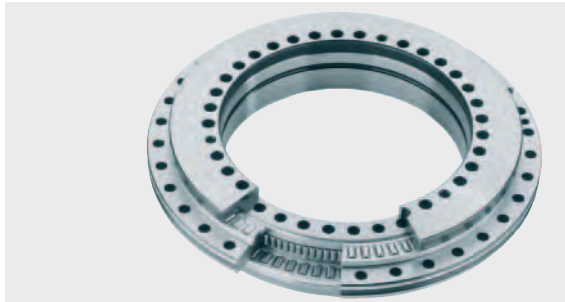
## Axial/radial bearings

YRT



107 305A

RTC



107 520B

## For higher speeds

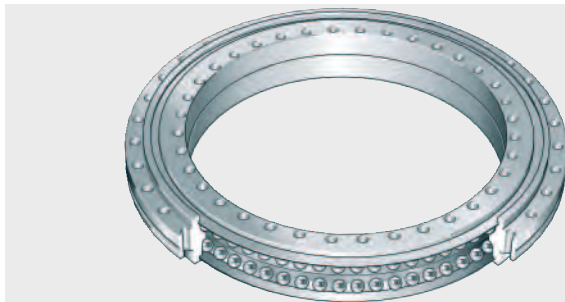
YRT<sub>Speed</sub>



107 485C

## Axial angular contact ball bearings

ZKLDf



107 306A

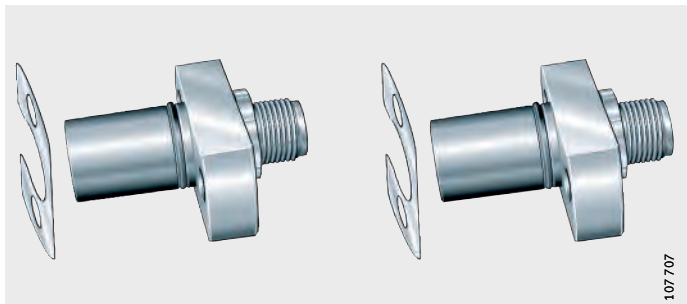
**Axial/radial bearings  
with integral  
angular measuring system**  
With magnetic dimensional scale

YRTM, YRTSM

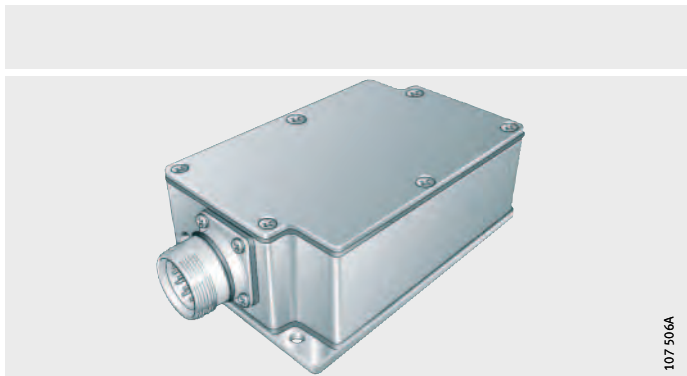


**Electronic measuring system**  
Measuring heads with shims

SRM

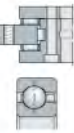
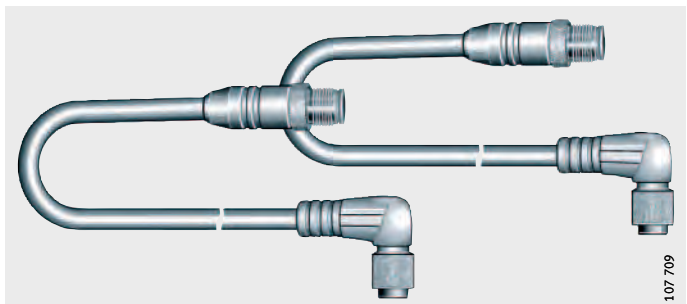


Electronic evaluation system



**Connection cable**  
For measuring heads and  
electronic measuring system

SRMC



# High precision bearings for combined loads

## Features

Axial/radial bearings YRT, RTC and YRT<sub>Speed</sub> as well as axial angular contact ball bearings ZKLDF are ready-to-fit high precision bearings for high precision applications with combined loads.

They can support radial loads, axial loads from both sides and tilting moments without clearance and are particularly suitable for bearing arrangements with high requirements for running accuracy, such as rotary tables, face plates, milling heads and reversible clamps.

Due to the fixing holes in the bearing rings, the units are very easy to mount.

The bearings are radially and axially preloaded after mounting.

The mounting dimensions of all series are identical.

## Operating limits

For standard applications with low speeds and small operating durations, such as indexing tables and swivel type milling heads, the most suitable bearing is series YRT, *Figure 1* ④. These bearings are available in two axial and radial runout accuracies.

Where comparatively lower friction and higher speeds are required, bearings of series RTC can be used, *Figure 1* ③. For higher accuracy requirements, these bearings are also available with restricted axial runout accuracy.

For the bearing arrangements of direct drive axes, series YRTS is available. Due to their high limiting speeds and very low, uniform frictional torque across the whole speed range, these bearings are particularly suitable for combination with torque motors, *Figure 1* ②.

Axial angular contact ball bearings ZKLDF are particularly suitable for high speed applications with long operating duration, *Figure 1* ①. They are characterised by high tilting rigidity, low friction and low lubricant consumption.

$n_G$  = limiting speed

$c_{kL}$  = tilting rigidity

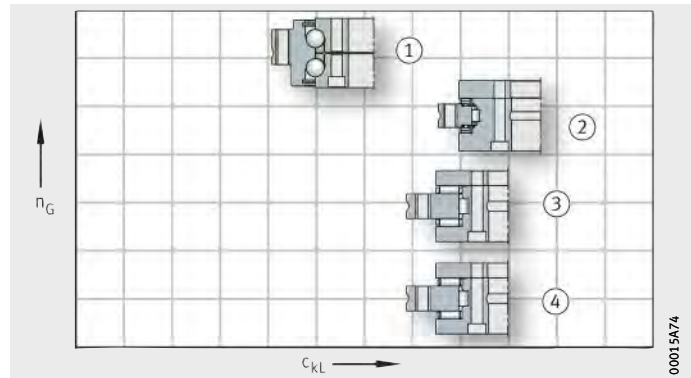
① ZKLDF

② YRT<sub>Speed</sub>

③ RTC

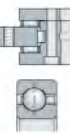
④ YRT

*Figure 1*  
Speed and tilting rigidity





|  |  |
|--|--|
| <b>Axial/radial bearings</b>               | <p>Axial/radial bearings YRT, RTC and YRT<sub>Speed</sub> have an axial component and a radial component.</p> <p>The axial component comprises an axial needle roller or cylindrical roller and cage assembly, an outer ring, L-section ring and shaft locating washer and is axially preloaded after mounting.</p> <p>The radial component is a full complement (YRT, RTC) or cage guided, preloaded cylindrical roller set. The outer ring, L-section ring and shaft locating washer have fixing holes.</p> <p>The unit is located by means of retaining screws for transport and safe handling.</p> |
| <b>Sealing</b>                             | Axial/radial bearings are supplied without seals.  |
| <b>Lubrication</b>                         | <p>Bearings of series YRT and YRT<sub>Speed</sub> are greased using a lithium complex soap grease to GA08 and can be lubricated via the outer ring and L-section ring.</p> <p>Arcanol LOAD150 is suitable for relubrication.</p> <p>Bearings of series RTC are greased with Arcanol MULTITOP.</p>  |
| <b>Axial angular contact ball bearings</b> | <p>Axial angular contact ball bearings ZKLDF comprise a single-piece outer ring, a two-piece inner ring and two ball and cage assemblies with a contact angle of 60°. The outer ring and inner ring have fixing holes for screw mounting of the bearing on the adjacent construction.</p> <p>The unit is located by means of retaining screws for transport and safe handling.</p>   |
| <b>Sealing</b>                             | Axial angular contact ball bearings have sealing shields on both sides.  |
| <b>Lubrication</b>                         | The bearings are greased with a barium complex soap grease to DIN 51 825-KPE2K-30 and can be lubricated via the outer ring.  |
| <b>Further information</b>                 | Axial/radial bearings and axial angular contact ball bearings are described in detail in Catalogue HR 1, Rolling Bearings.   |



# High precision bearings for combined loads

## **Axial/radial bearings with integral angular measuring system**

Axial/radial bearings are also available with an angular measuring system. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means.

Axial/radial bearings with an integral angular measuring system comprise an axial/radial bearing YRTM or YRTSM with a dimensional scale, an SRM electronic measuring system and signal leads SRMC.

The electronic measuring system SRM comprises two measuring heads, two stacks of shims and an electronic evaluation system.

The signal leads for connecting the measuring heads to the electronic evaluation system can be ordered individually in various designs.

The electronic measuring system MEKO/U will continue to be available but should no longer be used for new designs.

Bearings of series YRTM or YRTSM correspond in mechanical terms to axial/radial bearings YRT or YRTS but are additionally fitted with a magnetic dimensional scale. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means.

For the mechanical part of axial/radial bearings YRTM or YRTSM, please refer to the information on page 1063.

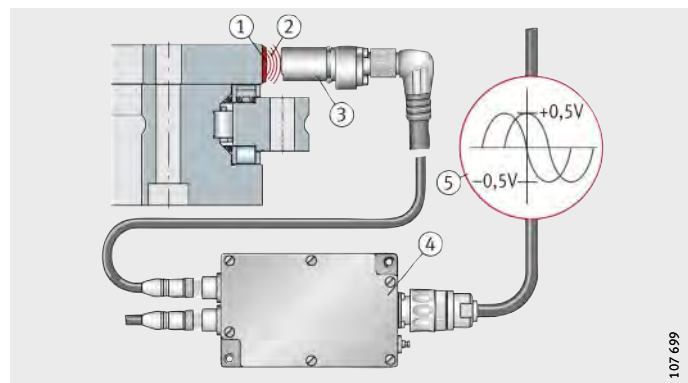
Advantages of the angular measuring system

The measuring system, *Figure 2*:

- allows, due to the rigid connection to the adjacent construction, very good control characteristics (control stability and dynamics) and is therefore particularly suitable for axes with torque motor drive
- offers a high maximum measuring speed of up to 16,5 m/s
- operates by non-contact means and is therefore not subject to wear
- carries out measurement irrespective of tilting and position
- has automatically self-adjusting electronics
- has a self-centring function
- is unaffected by lubricants
- is easy to mount, the measuring heads are easily adjustable and there is no need for alignment of the bearing and a separate measuring system
- requires no additional parts
  - the dimensional scale and measuring heads are integrated in the bearing and adjacent construction respectively
  - the resulting space saved can be used for the machining area of the machine
- does not give any problems relating to supply lines, since these can be laid within the adjacent construction directly through the large bearing bore
- gives savings on components, overall design envelope and costs due to the compact, integrated design requiring fewer components.

- ① Magnetic scale
- ② Magnetic field lines
- ③ Measuring head with magneto-resistive sensor
- ④ Electronic evaluation system
- ⑤ Analogue signals at output

*Figure 2*  
Measurement principle



**Further information**

Comprehensive information on axial/radial bearings with an integral measuring system is given in TPI 120, High Precision Bearings for Combined Loads. This publication is available on request.





## Thin section bearings

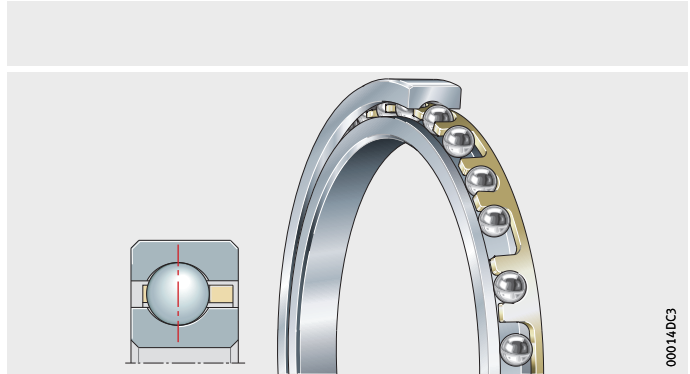
# Thin section bearings

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| <b>Features</b> Deep groove ball bearings, four point contact bearings,<br>angular contact ball bearings..... | 1069 |

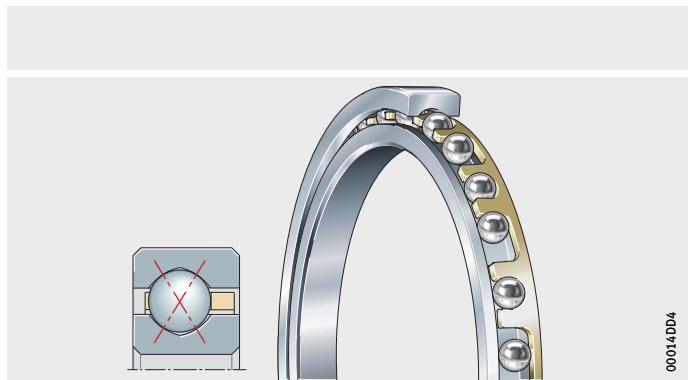


# Product overview Thin section bearings

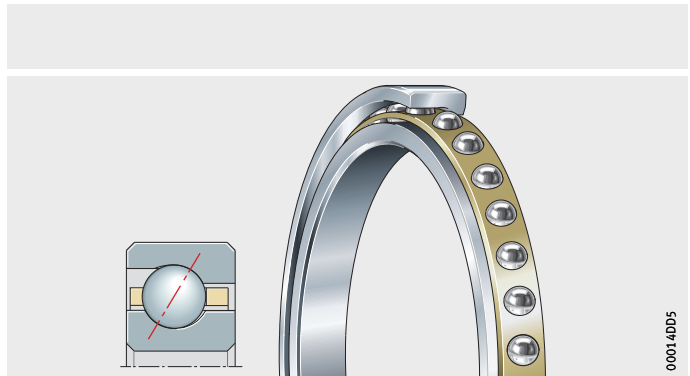
**Deep groove ball bearings**  
Type C



**Four point contact bearings**  
Type X



**Angular contact ball bearings**  
Type E



# Thin section bearings

**Features** Thin section bearings are high precision products with very little running noise and high load carrying capacity. These bearings are available in three different designs with extremely small, predominantly square cross-sections. Within each series, the cross-section remains constant even in the case of larger shaft and housing bore diameters. The bearings are therefore also described as Constant Section (CS) bearings. This feature distinguishes thin section bearings from the conventional bearings that are described in standardised ISO series.

In this way, a larger cross-section can be selected in a graduated way and thus a bearing with high load carrying capacity can be used without the need to increase the shaft diameter.

Thin section bearings can thus be used to achieve extremely light and compact designs.

## Deep groove ball bearings, four point contact bearings, angular contact ball bearings

Thin section bearings are available as deep groove ball bearings (C), four point contact bearings (X) and as angular contact ball bearings (E).

Each of these designs is available in various series. The series correspond to the cross-section sizes. The balls are matched to the series.

Deep groove ball bearings can support axial loads in both directions as well as radial loads; under axial load, a contact angle  $\alpha > 0^\circ$  is adopted.

Four point contact bearings can support axial loads in both directions as well as radial loads; they thus act as double row angular contact ball bearings.

Angular contact ball bearings can be filled with an optimised number of balls and have a contact angle of  $30^\circ$ .

They can support considerably higher radial loads than deep groove ball bearings or four point contact bearings and can support axial loads in one direction. For particular requirements, angular contact ball bearings are also available as matched pairs of bearings. These combinations then have significantly higher rigidity and load carrying capacity than individual bearing solutions.

Thin section bearings are available in designs that are either open or sealed on both sides.

The seals are made from synthetic rubber (NBR) with a steel insert.

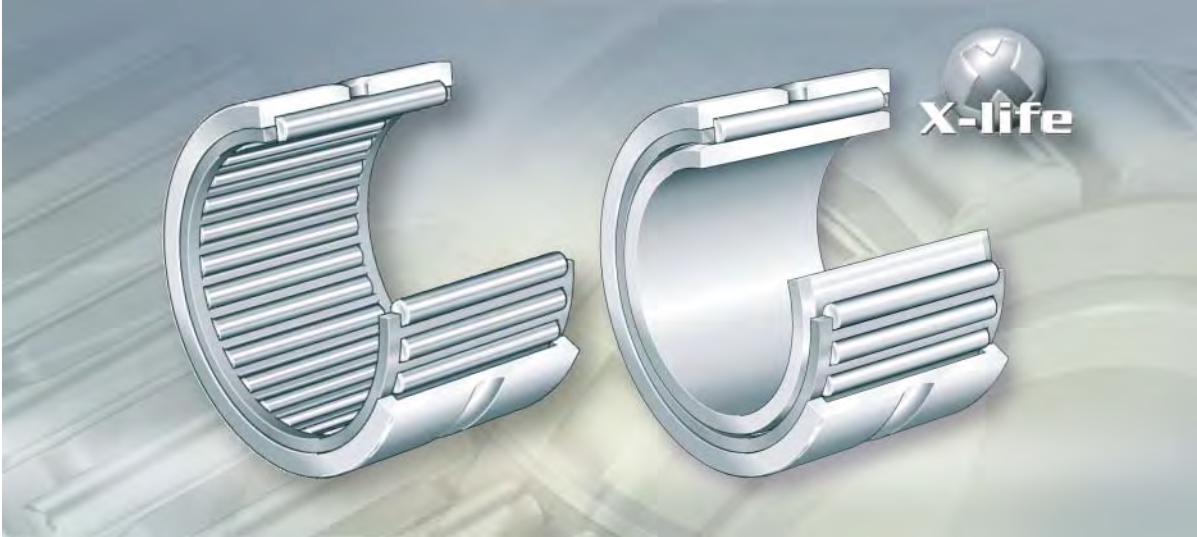
Sealed bearings are greased. For extreme operating conditions, special lubricants are available. Cages are made from brass or plastic.

In addition to the standard tolerance class PL1, classes PL3 and PL6 are also available (with increasingly tighter tolerances).

## Product catalogue

The standard range is described comprehensively in Catalogue 575, Thin Section Bearings.





## Needle roller bearings with ribs

Needle roller bearings without inner ring

Needle roller bearings with inner ring

Inner rings



# Needle roller bearings with ribs

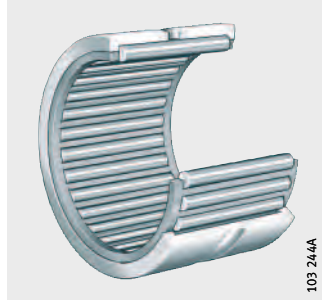
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# Product overview Needle roller bearings with ribs

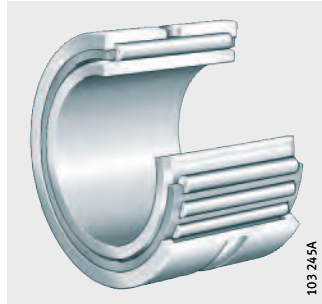
## Needle roller bearings without inner ring

RNA48



## Needle roller bearings with inner ring

NA48



## Inner rings

IR



# Needle roller bearings with ribs

**Features** Needle roller bearings with ribs are single or double row units comprising machined outer rings with ribs, needle roller and cage assemblies and removable inner rings.

**X-life** Needle roller bearings with ribs are X-life bearings. These bearings have optimised raceway surfaces. This gives higher load carrying capacity and longer rating life.

**Needle roller bearings without inner ring** Bearings without inner ring RNA48 have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground.

The bearings are of a single row design.

**Needle roller bearings with inner ring** Bearings with inner ring NA48 are used if the shaft is not configured as a rolling bearing raceway.

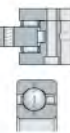
The bearings are of a single row design.

**Inner rings** Inner rings IR are made from hardened rolling bearing steel and have precision machined raceways.

They are used where:

- the shaft cannot be used as a raceway for needle roller bearings
- needle roller bearings must be combined with wider inner rings in order to allow larger axial displacements of the shaft in relation to the housing
- optimum running surfaces are required for seal lips.

**Further information** Needle roller bearings are described in detail in Catalogue HR 1, Rolling Bearings.





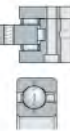
**FAG**



## Mounting and maintenance

# Mounting and maintenance

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# Mounting and maintenance

## Our portfolio Products and services

Within its industrial service concept, Schaeffler offers high quality products, services and training, *Figure 1*.

Portfolio

The portfolio comprises:

- mounting
- lubrication
- condition monitoring
- reconditioning.

The employees of Schaeffler worldwide will be pleased to help you select the ideal products, services and training courses, *Figure 1*.



*Figure 1*  
Portfolio

## Industrial Aftermarket

Schaeffler Industrial Aftermarket (IAM) is responsible for replacement parts and service business for end customers and sales partners in all significant industrial sectors. On the basis of innovative solutions, products and services relating to rolling bearings, the service function of Schaeffler Industrial Aftermarket offers a comprehensive portfolio that covers all phases in the lifecycle of the bearing and takes account of the total costs (TCO).

The aim is to help customers save on maintenance costs, optimise plant availability and avoid unforeseen machine downtime. Schaeffler Industrial Aftermarket offers each customer an individual concept solution.

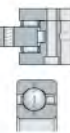
Schaeffler has centres of competence all around the world. This means we can provide customers worldwide with products, services and training quickly and professionally. All service employees worldwide undergo a comprehensive training programme and are audited regularly by officially certified specialists. This ensures that services throughout the world conform to a uniformly high standard of quality.

## Mounting Toolbox – Mounting made easy

The Schaeffler Mounting Toolbox brings together valuable knowledge relating to mounting and dismounting, *Figure 2*. In individual video sequences, the service experts present step by step the points that must be paid close attention for correct mounting, lubrication and alignment.

<http://mounting-toolbox.schaeffler.com>  
Mobile website:  
<http://mtb.schaeffler.de/com>

*Figure 2*  
Mounting Toolbox



# Mounting and maintenance

**Mounting** The mounting personnel in the Industrial Service function are trained and skilled personnel who can provide reliable, rapid and competent assistance. The mounting services are provided either at your location or at Schaeffler.

- Mounting services** The mounting services include, *Figure 3*:
- mounting and dismantling of bearing arrangement units
  - acceptance inspection of mating parts for the rolling bearings (shafts and housings)
  - measurement and production inspection of tapered shaft seats, together with provision of the necessary measuring equipment
  - maintenance and inspection of bearing arrangements
  - support in achieving optimum mounting operations
  - the use of modern mounting tools, such as heating by means of versatile medium frequency technology
  - the design and manufacture of special tools.



*Figure 3*  
Mounting service on a converter

- Advantages** The mounting services give the following advantages:
- extended bearing life
  - considerable cost reductions
  - less unplanned downtime
  - increased plant availability
  - correct use of bearings and housings.

**Further information**

- Enquiries:  
[industrial-services@schaeffler.com](mailto:industrial-services@schaeffler.com),  
+49 2407 9149-66.



**Equipment rental** Customers who require special mounting and dismantling tools or measuring equipment only infrequently can rent these from Schaeffler for a fee.

Schaeffler offers rental of the following equipment:

- hydraulic nuts
- hand pump sets
- heating devices using medium frequency technology
- large induction heating devices.

The devices are checked after each use by the Schaeffler experts and, where necessary, restored to full working order.

**Further information** ■ Enquiries:  
industrial-services@schaeffler.com,  
+49 2407 9149-66.

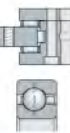
**Mechanical tools** Mechanical tools are designed for the mounting and dismantling of bearings.

**Further information** ■ For detailed information, see Catalogue IS 1, Mounting and Maintenance of Rolling Bearings.

**Thermal tools** Induction heating devices are used to heat rolling bearings or components with a cylindrical bore in mounting and dismantling. In addition to various induction heating devices operating with mains frequency technology, Schaeffler also offers induction heating devices with medium frequency technology. Adequate expansion of the bearings is normally achieved at +80 °C to +100 °C. During the heating operation, the maximum heating temperature must be observed. In the case of plain bearings, the temperature may not normally exceed +120 °C, in order to avoid damage to the seals. In all devices for heating, the temperature can be steplessly controlled.



Wear protective gloves during mounting and dismantling of heated parts.



## Mounting and maintenance

Induction units  
with medium frequency technology

FAG heating devices with medium frequency technology give rapid, simple heating of medium-sized to large bearings, housings and similar steel parts for mounting and dismounting. The device always comprises two parts: an inductor and a generator.

The inductor can be of a flexible or rigid design. The rigid design is particularly suitable for batch applications. The flexible design of inductor can be wound around the components.

Each device is designed for the specific application and is fitted, depending on the workpiece, with flexible or rigid inductors. Due to its compact construction, the device can also be used for mobile operation.



*Figure 4*  
Heating device  
with medium frequency technology:  
generator and inductor

### Advantages

The advantages of the heating device with medium frequency technology are as follows:

- suitable for mounting and dismounting
- operating frequency from 10 kHz to 25 kHz
- efficiency of the generator higher than 90%
- low energy requirements
- short heating times
- control of heating according to time and temperature
- automatic demagnetisation
- flexible and rigid inductors available
- suitable for use either inside or outside component
- lower mains connection power than heating devices with mains frequency
- almost silent
- air-cooled system.

**Hydraulic tools** Hydraulic tools can be used to apply large forces. These tools are therefore particularly suitable for the mounting and dismounting of large bearings or components with a tapered bore.

Hydraulic nuts are used as a mounting tool. Pressure can be generated using oil injectors, hand pumps or hydraulic units.

**Hydraulic nuts** Hydraulic nuts HYDNUT, see table, are used to press components with a tapered bore onto their tapered seat. Presses are mainly used if the drive-up forces required cannot be applied using other accessories, e.g. shaft nuts or pressure screws.

The main applications are as follows:

- mounting and dismounting of bearings with a tapered bore. These bearings with a tapered bore can be seated directly on a tapered shaft, an adapter sleeve or a withdrawal sleeve
- dismounting of withdrawal sleeves and adapter sleeves.

**Available hydraulic nuts**

| Designation                               | Design   | Application   |
|---|--|---|
| <b>HYDNUT50 to HYDNUT200</b>              | With metric fine pitch thread to DIN 13  | Adapter and withdrawal sleeves                        |
| <b>HYDNUT205 to HYDNUT1180</b>            | With trapezoidal thread to DIN 103   | With metric dimensions                                |
| <b>HYDNUT90-INCH to HYDNUT530-INCH</b>    | With inch size thread to ABMA "Standards for Mounting Accessories, Section 8, Locknut Series N-00" | Sleeves with inch dimensions                          |
| <b>HYDNUT100-HEAVY to HYDNUT900-HEAVY</b> | Increased capacity design with smooth bore   | For high mounting forces, for example in shipbuilding |

**Further information**

- For detailed information, see TPI 196, FAG Hydraulic Nuts
- Enquiries: [industrial-services@schaeffler.com](mailto:industrial-services@schaeffler.com), +49 2407 9149-66.



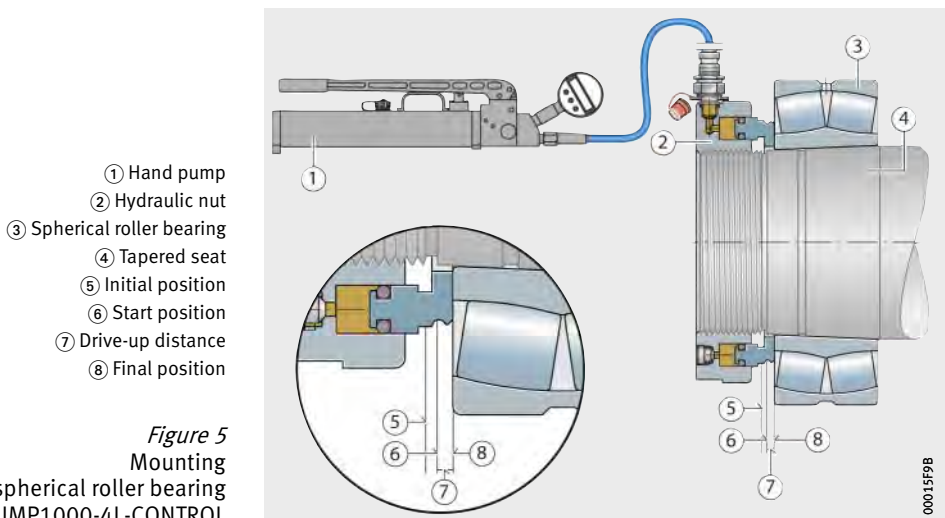
## Mounting and maintenance

### Pump for drive-up distance

The hand pump PUMP1000-4L-CONTROL is particularly suitable as a pressure generation device where bearings with a tapered bore are to be driven onto their tapered seat using a hydraulic nut, *Figure 5*.

First, the bearing is driven smoothly onto the tapered seat as far as the initial position. A suitable hydraulic nut is then screwed onto the shaft and the hand pump is connected. The hand pump is then operated until the pressure to reach the start position is achieved. The pump is then operated further to drive the bearing by the required drive-up distance and thus achieve the final position.

The user manual for the pump PUMP1000-4L-CONTROL contains a table that shows the number of strokes necessary to achieve the required drive-up distance of the bearing. The required drive-up distance is calculated using the software Mounting Manager.



### Scope of delivery

Hand pump with digital manometer  
 High pressure hose with coupling sleeve  
 Spacer ring (HYDNUT50 to HYDNUT150)  
 Push fit coupling nipple  
 User manual  
 Metal case.

### Ordering designation

**PUMP1000-4L-CONTROL**

**Lubrication** In more than half of all cases, inadequate lubrication is the cause of unplanned machine downtime. The life of machine elements undergoing swivel, rotary or linear motion can be significantly extended by the use of greases appropriate to the different operating and environmental conditions as well as the definition of and adherence to lubrication intervals and quantities.

**Services** Services relating to lubrication include:

- selection of lubricants and lubrication systems
- the preparation of lubrication and maintenance plans
- lubrication point management
- consultancy on lubricants
- lubricant investigations and tests.

**Advantages** The services help in:

- preventing failures
- increasing in productivity
- reducing lubrication costs.

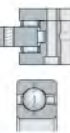
**Lubricants** The lubricants available from Schaeffler are designed and tested for bearing arrangement technology.

**Arcanol rolling bearing greases** The 18 different greases cover almost all applications, see table, page 1050. They are developed by experienced application engineers and are produced by the best manufacturers in the market. Different greases are used depending on the particular application.

Rolling bearing greases under the name Arcanol are subjected to 100% quality inspection. The inspection methods at Schaeffler are among the most demanding in the market. As a result, Arcanol rolling bearing greases fulfil the highest quality requirements.



*Figure 6*  
Analysis  
of the thermal behaviour of greases



## Mounting and maintenance

|                             |   |
|-----------------------------|---|
| Lubrication devices         | Lubricators and lubrication systems automatically provide bearings with the correct quantity of lubricant. This prevents failure due to inadequate or incorrect lubrication. Approximately 90% of bearings are lubricated with grease. Relubrication with the correct quantity of grease at the appropriate intervals gives a significant increase in the life of bearings. |
| Lubrication systems         | A single-point or multi-point lubrication system can supply lubrication points precisely and irrespective of temperature. The dispensing times can be set variably.   |
| Lubrication system CONCEPT8 | This single-point and multi-point lubrication system can grease up to eight lubrication points, <i>Figure 7</i> . Suitable grease cartridges (LC units) are available in the size 800 cm <sup>3</sup> . The lubrication system controls the greasing of the lubrication points independently of the machine.  |



*Figure 7*  
FAG CONCEPT8

### Advantages

The advantages of the lubrication system are as follows:

- suitable for oil and grease up to NLGI 3
- reliable piston pump as delivery pump
- operating temperature from  $-20\text{ }^{\circ}\text{C}$  to  $+70\text{ }^{\circ}\text{C}$
- low operating voltage of DCV 24
- pressure buildup to max. 70 bar, thereby overcoming any obstructions.

### Further information

- For detailed information, see WL 80 382, FAG CONCEPT8 and Catalogue IS 1, Mounting and Maintenance of Rolling Bearings
- Enquiries:  
industrial-services@schaeffler.com,  
+49 2407 9149-66.

**Alignment** Alignment is worth performing and gives savings in resources. Precise alignment ensures lower operating and maintenance costs in the long term. In addition, wear is reduced, the lifetime of machinery is increased and energy costs are cut.

**Shaft alignment device  
FAG Top-Laser EQUILIGN** The FAG Top-Laser EQUILIGN is an alignment system for coupled and decoupled shafts in motors, pumps, ventilators and gearboxes with rolling bearings, *Figure 8*.

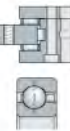
- Advantages** The alignment system has the following advantages:
- simple mounting
  - error-free handling even by untrained personnel using step-by-step display on the manual control device
  - automatic tolerance checking.  
A symbol indicates when the shafts are correctly aligned
  - more precise alignment than with conventional methods
  - rapid, simple measurement by means of Active Clock measurement mode
  - robust control device.  
Watertight and insensitive to contamination in accordance with IP65
  - user interface in 19 languages
  - easy generation of reports
  - real time display of displacement in all axes.

**Caution** 

Do not look into the laser beam or point the laser beam into another person's eyes.



*Figure 8*  
Shaft alignment device  
FAG Top-Laser EQUILIGN

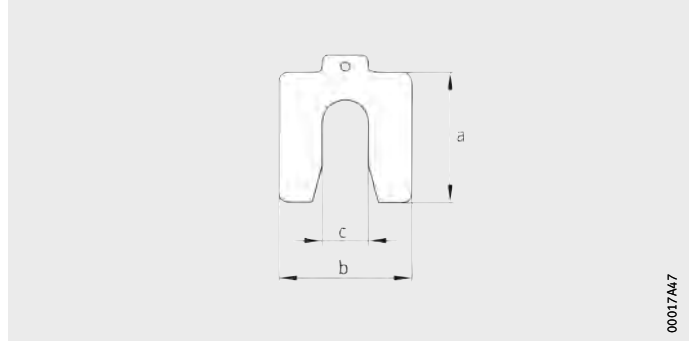


## Mounting and maintenance

### Shims FAG Top-Laser SHIM

Shims FAG Top-Laser SHIM are used to eliminate vertical misalignment or soft feet.

These shims are made from corrosion-resistant alloy steel and are available in seven thicknesses (0,05 mm, 0,1 mm, 0,2 mm, 0,5 mm, 0,7 mm, 1 mm, 2 mm) and in four sizes (dimension  $c = 15$  mm, 23 mm, 32 mm, 44 mm), *Figure 9*.



*Figure 9*  
Shim, dimensions



## Condition monitoring

The malfunction-free and optimised operation of complex machinery and plant can normally only be achieved by means of condition-based maintenance. By preference, Schaeffler uses vibration diagnosis for this task.

This method makes it possible to detect damage in machinery at a very early stage. This means that, for example, damaged components can be replaced as part of planned downtime. Unscheduled downtime is avoided.

Depending on the type of machine and its importance for the production process, condition monitoring can be carried out by means of either continuous (online) monitoring or regular (offline) monitoring.

## Continuous monitoring

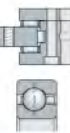
For production-critical machinery, continuous monitoring by means of vibration diagnosis is indispensable in many cases, *Figure 10*.

In addition to giving advice on selecting the right system, Schaeffler also implements monitoring of the machine. This includes not only hardware selection but also system configuration and, where necessary, its integration into existing systems.

The customer can decide whether to carry out plant monitoring himself or to enlist the services of Schaeffler for online monitoring. Due to the communication options of the monitoring systems, remote analysis can be carried out by the Schaeffler experts.



*Figure 10*  
Continuous monitoring



# Mounting and maintenance

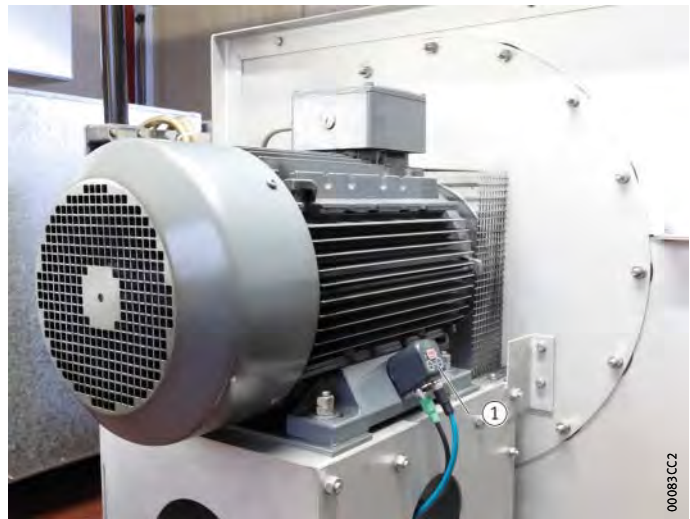
- Regular monitoring** The failure of so-called “B” or “C” category plant items does not lead directly to downtime and does not therefore necessarily entail expensive secondary damage. In the case of such machine parts, regular monitoring is generally recommended as a more economical option.
- In this type of monitoring, machinery is examined and assessed by vibration analysis at regular intervals, for example every four weeks. This regularity gives more in-depth knowledge of the normal condition of the machine. Deviations can thus be detected. For the monitoring concept, the selection of measurement points and monitoring accessories as well as the measurement interval play a decisive role.
- If deviations occur during measurement or if trends are to be investigated, the data can be sent to the Schaeffler Diagnosis Centre. Vibration experts will then analyse the data and prepare a diagnosis report. Through working with the Schaeffler experts, customers can build up their own know-how in analysis.
- If no personnel are available for data logging, Schaeffler can also offer support in data logging. Its experts can carry out regular measurements on site.
- Troubleshooting** Where malfunctions occur on a machine, defects must be detected and rectified very quickly. Based on many years of experience with different sectors and applications, the Schaeffler diagnosis experts are well versed in such troubleshooting tasks.
- Problems or malfunctions in machine operation often become apparent through changes in vibration behaviour, unusual temperature patterns or similar phenomena. The investigation is closed out by a handover discussion between the diagnosis experts and all relevant employees on site. In addition to the results of the investigation, the recommended countermeasures are discussed in particular.
- Further information** ■ Enquiries:  
industrial-services@schaeffler.com,  
+49 2407 9149-66.

### Condition monitoring with FAG SmartCheck

For condition-based maintenance, Schaeffler uses vibration diagnosis as a preferred method. FAG SmartCheck is an innovative, economical measuring system for real time monitoring, *Figure 11*.

FAG SmartCheck is suitable, for example, for early detection of rolling bearing damage, imbalances and misalignments on:

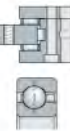
- electric and geared motors
- vacuum and fluid pumps
- ventilators and fans
- gearboxes and compressors
- spindles and machine tools
- separators and decanters.



① Positioning of FAG SmartCheck

*Figure 11*  
FAG SmartCheck  
on an electric motor

Commissioning is simplified since the device is supplied already loaded with a characteristic value set and predefined configuration templates. These can easily be matched to individual requirements.



# Mounting and maintenance

## Advantages

Further advantages include:

- reduction in life cycle costs
- compact design
- simple, rapid installation
- reliable real time monitoring of the machine
- intelligent process monitoring
- intuitive user concept
- simple integration in the controller and control facility
- modular accessories FAG SmartLamp, FAG SmartConnectBox and FAG SmartController
- complete service from a single source.

## Lubricant monitoring with FAG GreaseCheck

The monitoring of grease condition in ongoing operation can be achieved, for example, using FAG GreaseCheck. Due to its special electronic evaluation system, relubrication is no longer carried out as a function of time but as a function of condition. In this way, relubrication can be carried out at the correct time, making it possible to delay and in many cases completely prevent rolling bearing damage.

- ① Optical probe
- ② Electronic evaluation system

*Figure 12*  
Grease sensor FAG GreaseCheck



## Advantages

FAG GreaseCheck makes it possible to achieve:

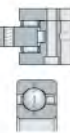
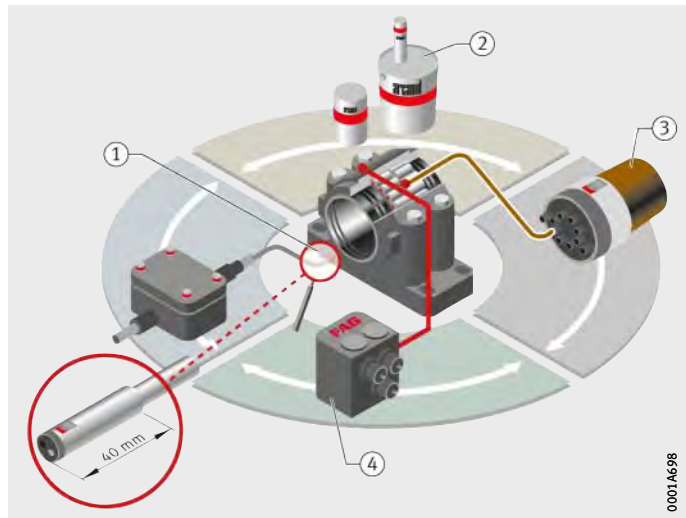
- lubrication matched to requirements
- increased plant availability
- optimised grease quantities and relubrication intervals
- lower lubricant costs
- lower service and maintenance costs.

### Comprehensive monitoring

An innovative system for comprehensive monitoring combines grease and vibration diagnosis with a lubricator that is controlled by the monitoring devices. In this way, any critical change during ongoing operation can be detected and rectified before damage occurs in the rolling bearing. In particular, plant that is difficult to access or failure-critical can be comprehensively monitored and always provided with an optimum supply of grease, without the need for skilled personnel to be present on site, *Figure 13*.

- ① FAG GreaseCheck
- ② Arcanol greases
- ③ FAG CONCEPT8
- ④ FAG SmartCheck

*Figure 13*  
Comprehensive monitoring  
of rolling bearings





**FAG**



## Market sectors

Production machinery

Power transmission

Railway engineering

Wind turbines

Heavy industry

Energy

Consumer products

## Market sectors

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|                             | Bearings for woodworking machinery..... 1099                                    |
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## Market sectors

Schaeffler develops, manufactures and supplies ball bearings, roller bearings, bearing units, housings and accessories worldwide for almost all machinery, plant, vehicles and equipment.

We also provide a comprehensive range of services for advice, maintenance and mounting.

Our customers are found in the areas of production machinery, power transmission, railway engineering, wind turbines, heavy industry and consumer products.

### Production machinery

High performance production machinery is a precondition for, and a driving force of, technical progress.

High precision bearings set standards both in their main application sector in machine tools and also in equipment for the textile industry, in printing machinery, woodworking machinery and machines for the food industry. They fulfil very high requirements for reliability, high running accuracy and high speeds. Comprehensive information is given in Catalogue SP 1, Super Precision Bearings.

### Bearings for machine tools

Hybrid spindle bearings with steel rings and ceramic balls are finding increasing usage due to their particular speed capacity, robust characteristics and reliability as well as their significantly longer operating life. For very high requirements in terms of load carrying capacity and speed capacity, special X-life ultra bearings with rings made from high performance steel and balls made from ceramic have been developed.

Single and double row cylindrical roller bearings of high precision design are ideal for use as non-locating bearings, since they allow length compensation without constraining forces between the rollers and raceways. They give bearing arrangements with high radial rigidity, high load carrying capacity and high accuracy.

Double direction axial angular contact ball bearings of series 2344 and 2347 are used as particularly rigid axial bearings when cylindrical roller bearings of series N10 and NN30 support the radial forces.



## **Bearings for printing machinery**

Printing machinery bearings are used in the bearing arrangements of the main cylinders in sheetfed and webfed printing machines, *Figure 1*, page 1096.

Due to their load carrying capacity, rigidity, accuracy and precise adjustability, they provide excellent support for the central requirement in printing machinery, namely the highest possible print quality.

The bearings are specially designed for each application in close partnership between printing machinery manufacturers and our Application Engineering functions. As a result, the customer only receives bearings that are precisely matched to his requirements. This matching of design to the specific machine concept is particularly important, since exceeding requirements is a drain on resources and failing to meet requirements impairs performance. Finding the optimum solution, however, is not always easy. Due to its considerable experience in the development, design and manufacture of bearings, Schaeffler has the know-how necessary to always offer the best solution for an application in this complex bearing sector. Furthermore, it is able to do so in both technical and economic terms.



## Market sectors

Due to the wide range of requirements, standardisation of printing machinery is only possible to a limited extent. The range therefore comprises a large number of types and sizes.

In addition to the classic multi-row, high precision cylindrical roller bearings NN, NNU, N4N, N4U, use is also made of non-locating bearing units with and without eccentric geometries, locating bearing units, polygon bearings, linear bearing units, rotary bearing units and tapered roller bearing units. The bearings are available with and without seals. The bearing seat for the cylindrical stud can be of a cylindrical or tapered design.

Printing machinery bearings are cost-effective bearing arrangement systems that can be used to achieve the demands of the print industry for high productivity, low maintenance costs and excellent print quality.



*Figure 1*  
Printing machine bearing unit  
with eccentric outer ring  
as non-locating bearing

Special publications

TPI 222  
Publication PDM

High Precision Bearings for Printing Machinery  
Bearing Solutions for Printing Machinery.

## Bearings for textile machinery

Whether it is spinning or weaving, finishing or processing, modern textile machines are highly automated and must run with high material throughput and without malfunctions, right around the clock. There is no question that the right bearing components play a crucial role here. In this context, “right” means low friction, high accuracy, clearance-free, easy to mount, low maintenance, long service life, low noise and reliable.

In order to fulfil these requirements, Schaeffler has a comprehensive range of precision products for the reliable and cost-effective support of rotary and linear motion in textile machinery. We also have a range of system components that are precisely matched as complete systems to the specific application. Behind every one of these solutions lies years of experience in product development and the design of bearing arrangements.

Tape tension pulleys for gripper drives in weaving machines are renowned for their long life, *Figure 2*. These pulleys can be easily lubricated and have a very low moment of inertia. As a result, they run up to operating speed very quickly. In addition, the pulleys carry out up to 600 alternating rotary movements per minute in continuous operation with low energy consumption. This gives a considerable increase in the productivity and cost-efficiency of the machine while achieving a uniformly high fabric quality.

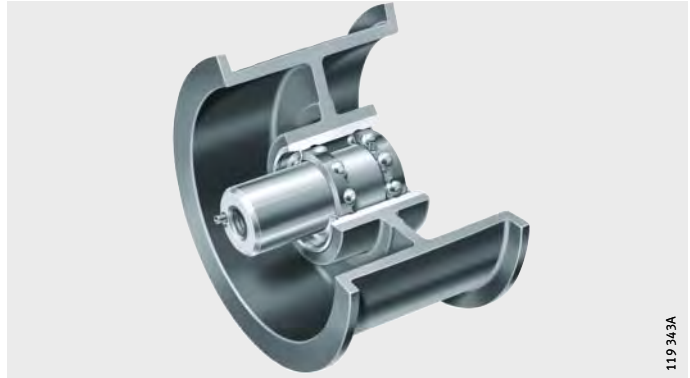


*Figure 2*  
Energy-saving tape tension pulley  
for the gripper drive



## Market sectors

We also have ready-to-fit tension pulleys with reduced running noise, *Figure 3*. Due to design measures, for example, the imbalance of these components has been reduced by 50%. As a result, it is no longer necessary to balance the pulleys separately.



*Figure 3*  
Tape tension pulley  
with optimised noise characteristics  
for twisting machines

Such ready-to-fit units are used in single and multi-head knitting machines and are simply screw mounted on the adjacent construction.

This eliminates the matching of individual components to each other and reduces errors involved in mounting. This solution also gives a simplified adjacent construction since the gearbox that was previously required can be completely eliminated.

The system comprises a lever, eccentric, connecting rod and the corresponding bearing units. The assembly converts the rotary motion of the drive shaft into the stroke motion for the knitting operation. Due to the smooth, high accuracy running of the bearings, the unit can achieve more than 1 000 strokes per minute. Highly effective seals ensure long life and low maintenance requirements.

Special publications

Publication TMB

Rolling Bearings for Textile Machinery.

## Bearings for the food and packaging industry

Food production must proceed economically and with high efficiency. In general, the processes run fully automatically and often take place under extreme operating conditions. This requires a high degree of security and reliability. High quality machine components designed for continuous performance are an indispensable element here.

Our contribution in this field: robust bearings with anti-corrosion protection, effective sealing and in many cases lubricated for life, for reliable round-the-clock operation.

Modern materials and surface coatings, which we work to improve by ongoing development, give our bearing arrangements the necessary advantages in rating life, *Figure 4*.



*Figure 4*  
Open and sealed  
deep groove ball bearings

In the case of insert bearings, track rollers, slewing rings or the entire range of linear motion products, catalogue products or specifically designed units, the focus of our development efforts on all these products is the benefit to the customer: reducing the presence of interfaces by functional integration, compact construction, freedom from maintenance, reliable operating life, effective matching of components and subsystems to each other.

Special publications

Publication PVP

Bearing Arrangements In Food and Packaging Machinery.

## Bearings for woodworking machinery

In many cases, deep groove ball bearings are adequate for the high speeds and relatively low loads in bearing arrangements for wood shapers. Very high speeds, however, normally require the use of spindle bearings.



## Market sectors

### Power transmission

Motors and transmissions must operate with increasing efficiency. In power transmission and construction machinery engineering as well as in industrial conveying trucks, high demands are placed on the quality and rating life of rolling bearings.

### Bearings for power transmission

Modern gearboxes transmit high power levels within a small space. This requires careful selection of rolling bearings with high performance capacity. In addition to load carrying capacity, reliable and cost-effective bearing arrangements also require appropriate design of the adjacent parts, lubrication and sealing. In order to take account of these influences, it is particularly advantageous to use the expanded life calculation method.

Depending on the gearbox design and tooth set type, almost all types of rolling bearings are used in power transmission.

The input shafts of cylindrical gear units are often supported by spherical roller bearings or tapered roller bearings, *Figure 5*. For particularly high speeds, combinations of cylindrical roller bearings supporting radial loads and four point contact bearings under axial load are suitable. For intermediate and output shafts, spherical roller bearings in a floating arrangement are often selected.



*Figure 5*  
Rolling bearings  
in a cylindrical gear unit

Special publications

PKI

Expertise for Bearing Arrangements in Industrial Gearboxes.

In bevel gear pairs, a narrow axial guidance is often required in order to ensure tooth mesh. A solution here is to use axially adjusted or matched tapered roller bearings or angular contact ball bearings.

The high axial forces in the worm shaft of worm gear units can be transmitted using matched or adjusted tapered roller bearings or angular contact ball bearings. For worm gear shafts, adjustability and narrow axial guidance of the tooth set are required. Deep groove ball bearings or adjusted tapered roller bearings are often used.

In order to support planet gears in planetary gearboxes, single or multiple row cylindrical roller bearings are used, with spherical roller bearings being mounted in special cases. Thicker planet gear studs can be achieved with direct bearing arrangements. The rolling elements then run directly on the planet gear stud. The hardness curve and surface quality of the raceway must be produced to particular specifications in order to ensure the load carrying capacity and operating life of the planet gear bearing arrangement.

### **Bearing arrangements in construction machinery**

Among the wide range of rolling bearing arrangements in construction machinery, the exciter shaft bearing arrangement in vibratory equipment deserves particular mention.

Road rollers, plate compactors, vibratory motors, vibratory piledrivers or vibrator frames work with mechanical vibrations. The exciter shafts and their eccentrically mounted weights run at high speeds. Deep groove ball bearings (for small vibratory equipment), spherical roller bearings and cylindrical roller bearings of the designs N and NU have proved successful here.

In order to compensate for misalignments and shaft deflections, the rollers and inner ring raceways of the cylindrical roller bearings have a logarithmic transverse profile. This allows tilting of up to 4 angular minutes without impairing the rating life. For greater tilting, the transverse profile can be adapted.

Special publications

PLB Expertise for Bearing Arrangements  
in Construction Machinery.

### **Bearing arrangements in industrial trucks**

Examples of special bearing designs can be found in fork lift trucks. Sensor bearings combine proven rolling bearing technology and modern sensor technology for drive, control and monitoring. This ready-to-fit system solution offers numerous cost and performance advantages.



## Market sectors

### Bearing arrangements and components in the fluid technology sector

Bearing arrangements and components for hydraulic drives and fluid pumps are subject to high requirements for functional security and cost-efficiency. These requirements are fulfilled predominantly using customer-specific developments but also in some cases with highly developed standard bearings and components.

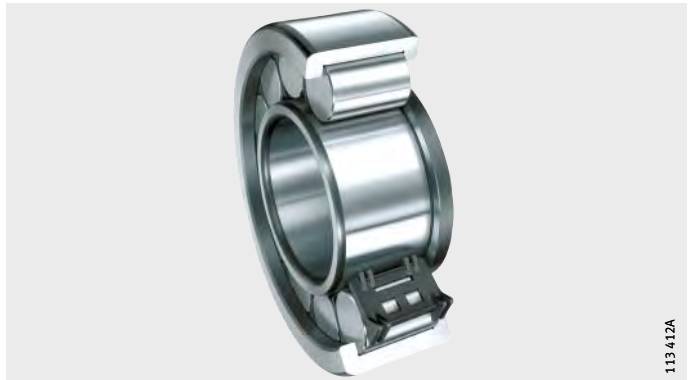
High torque motors are used, for example, in industry, in agricultural equipment, rolling mills, paper machinery and conveying equipment. They generate extremely high torques at low speeds. A decisive contribution to low starting friction, jolt-free and reliable operation is made by special cylindrical roller bearings and further components such as high precision locknuts. In addition to bearings with coated rolling elements, inner rings machined free from spiral marks are used to provide an optimum sliding surface for sealing rings.

In construction machinery, hydraulic power is an indispensable source of energy for earthmoving and transport. Hydraulic cylinders with maintenance-free spherical plain bearings from INA have sliding areas with ELGOGLIDE® coating. The dry plain bearings with low friction and high load carrying capacity are suitable for oscillating motion under high load. The bearings require very little space and are particularly environmentally-friendly. In axial piston pumps of a swash plate design, axial roller bearings support the high forces of the pistons acting in the direction of stroke.

The high imbalance forces and radial forces are supported by double row cylindrical roller bearings with optimised speed characteristics. Swash plate pumps with an adjustable cradle are used to allow precise control of excavators or road making machinery. Full complement or nearly full complement cylindrical roller bearings allow precise adjustment of the volume flow, even at high pressures.



Gear pumps convey coolants, transport foodstuffs and keep hydraulic systems moving. Plain bearings or high quality needle roller bearings ensure that gears move with practically no losses. In most cases, the medium being conveyed is also used as the lubricant for the bearings. If fluids with poor lubrication ability are to be conveyed, plain bearings are increasingly replaced by needle roller bearings. In this way, higher speeds and a longer operating life of the gear pumps can be achieved.



*Figure 6*  
Cylindrical roller bearings  
with spacers  
for low friction

Hydrostatic gearboxes give stepless transmission of the drive force in tractors, ride-on lawnmowers and similar machines. Their reliable function is ensured by means of rolling and plain bearings as well as INA precision components such as hollow pistons, valves and fine blanked parts.

Fluid pumps facilitate the supply of water for the purposes of drinking, extinguishing, heating and cooling, the conveying of aggressive or abrasive media and the disposal of, for example, contaminated and waste water.

Economical plain and rolling bearings ensure smooth running over the long term. Depending on the speed and load, ball bearings, cylindrical roller or spherical roller bearings or plain bearings are mounted, *Figure 6*. Rolling and plain bearings help to ensure that valves and shut-off systems function reliably after long periods of stoppage.

In various types of pumps, very high requirements are fulfilled using X-life bearings.

|                      |                 |  |
|----------------------|-----------------|--|
| Special publications | Publication PHP | Bearing Supports and Components for Hydraulic Drives and Pumps |
|                      | Publication PFS | Fine Blanking and Systems Engineering                          |
|                      | TPI 16          | Steel Sealing Rings DRG  |
|                      | TPI 92          | Axial Swash Plate Ball Bearings                                |
|                      | TPI 128         | Sealing Rings  |
| Catalogue HG1        | Plain Bearings. |  |



## Market sectors

### Railway engineering

People and goods are being moved with increasing speed and over increasing distances from one place to another.

#### Bearings for rail vehicles

In mainline and local trains, the dominant requirements are for higher speeds and smoother running.

Bearings and housings for wheelsets, transmissions and traction motors are selected by the Application Engineering specialists so that they are ideally matched to the customer requirements, *Figure 7*.

Wheelset bearings are subjected to extreme loads and must fulfil very high safety requirements.

For wheelsets, cylindrical roller bearings with smooth running, low friction and high speed suitability are frequently used in specially developed wheelset bearing housings.

Wheelset bearings with spherical roller bearings are available for rigid housings connected to the vehicle or bogie.

Tapered roller bearing units TAROL are suitable for high running speeds and high axial loads. The ready-to-fit units can be mounted in a single operation, are sealed, lubricated and have a specially adjusted axial internal clearance. They are supplied in metric sizes (UIC range) or to the AAR specification in inch sizes.

Increasingly, wheelset bearing units with integrated sensors (for speed, temperature, direction of rotation etc.) are being used.



*Figure 7*  
Tapered roller bearing unit  
for passenger train carriages

In hydrodynamic and mechanical railway transmissions with oil lubrication, radial bearings of practically all types are used to guide the pinion shafts, intermediate shafts and ring gear shafts.

In the axle suspension drive, which is normally lubricated by grease, cylindrical roller bearings, tapered roller bearings or spherical roller bearings are used.

For large gear bearing arrangements (gear hub), tapered roller bearings in an O arrangement matched by means of intermediate rings are predominantly used.

In the bearing positions of the traction motors, cylindrical roller bearings and deep groove ball bearings have proved successful.

For rail vehicles, there are also support and guide rollers, bearings in ancillary equipment, wheelset bearings with adapters, current-insulated deep groove ball bearings and cylindrical roller bearings to DIN/ISO dimensions, special Arcanol rolling bearing greases and mounting tools.

|                      |                 |  |
|----------------------|-----------------|--|
| Special publications | TPI 155         | Tapered Roller Bearing Units TAROL–<br>Products and Services         |
|                      | TPI 156         | Tapered Roller Bearing Units TAROL–<br>Mounting, Maintenance, Repair |
|                      | TPI 158         | Products for Railway Applications                                    |
|                      | TPI 184         | Suspension Tube Roller Bearings<br>for Rail Vehicles                 |
|                      | Publication PBS | Expertise in Bearing Technology<br>and Service for Rail Vehicles.    |



## Market sectors

### Wind turbines

#### Bearing arrangements in wind turbines

Wind turbines can now generate power levels of more than 3 MW.

The bearings must be able to support moderate to high loads, oscillation and vibration. Low friction standard rolling bearings are normally suitable here. The bearings are mounted in standard or special housings. For particular cases, special rolling bearings can also be used.

Rolling bearings for wind turbines must in many cases fulfil high quality requirements involving the presentation of appropriate evidence (German Lloyd certification guidelines).

The rotor bearing arrangement can be in the form of a shaft or hub bearing arrangement, *Figure 8*. Locating/non-locating bearing arrangements with spherical, cylindrical or tapered roller bearings have proved successful.

In the hub bearing arrangement, two tapered roller bearings are adjusted against each other. An alternative solution comprises a matched pair of tapered roller bearings as a locating bearing and a cylindrical roller bearing as a non-locating bearing.

For single bearing designs, support of forces and moments is combined in a multiple-row rolling bearing.



*Figure 8*  
Self-aligning  
FAG spherical roller bearings  
for rotor bearing arrangement

Small swivel movements in the adjustment of the rotor blade as well as high loads and tilting moments are normally supported by four point contact bearings.

As tower bearings, four point contact bearings support the large masses and wind forces.

In wind turbine gearboxes, all types of rolling bearings normally found in gearbox construction are used.

Special publications

WL 01206

Expertise in Bearing Technology and Service for Wind Energy Installations.

## Heavy industry

The difficult operating and environmental conditions in all areas of heavy industry require rolling bearings that are proven even in critical applications. This applies to mining, materials processing, the steel industry, the paper industry and the air handling sector.

## Bearing arrangements for the steel industry

The bearing arrangements in steelworks and rolling mills are generally subjected to very high loads and in many cases also to high temperatures and contamination. In addition to standard rolling bearings, bearings specially designed for these conditions are required.

The rolling bearings for converters must support not only large masses but also severe shocks. Large spherical roller bearings of split or unsplit design fulfil these requirements.

Axial spherical roller bearings or slewing rings are used as the main bearings in the turrets of continuous casting plant to support the masses and the tilting moment. The swivel arms are supported in radial spherical plain bearings.

At the inner support point of driven guide rollers, split roller bearings are used. In order to protect the bearings from the high slab temperatures as well as scale and coolant water, the housings are cooled using water.

The seals comprise lamellar sealing rings and labyrinth seals. For the support of non-driven guide rollers and the outer support of driven guide rollers, unsplit bearings are used.

Sealed spherical roller bearings reduce the grease consumption and thus the environmental impact, *Figure 9*.



*Figure 9*  
Sealed spherical roller bearing  
for strand guide rollers



## Market sectors

In order to support the high radial forces in rolling mills, cylindrical roller bearings with two or four rows are often selected, together with axial bearings in the form of deep groove ball bearings, angular contact ball bearings, double row tapered roller bearings, axial tapered roller bearings or axial spherical roller bearings. If tapered roller bearings with two or four rows are used as radial bearings, an additional axial bearing is not normally necessary.

Spherical roller bearings are common as roll bearings where high axial guidance accuracy is not required and speeds are low.

Sealed multi-row tapered roller bearings for work rolls reduce the grease consumption and thus the environmental impact, *Figure 10*.

Axial tapered roller bearings for screw-down mechanisms ensure low screw-down forces due to their low friction.



*Figure 10*  
Sealed  
four-row tapered roller bearing  
for work rolls

Single row cylindrical roller bearings as well as single and double row angular contact ball bearings are found predominantly in high speed rolling stands on wire and light section production lines.

The drive shafts in heavy duty rolling mills have a considerable mass. They were previously normally supported in plain bearings. Now, wear and lubricant requirements are considerably reduced due to the use of special cylindrical roller bearings of split design.

Spherical roller bearings are frequently used in gearboxes for rolling mills. In newer designs, the shafts are supported in double row cylindrical roller bearings as non-locating bearings and in double row tapered roller bearings as locating bearings. This bearing arrangement gives particularly accurate radial and axial guidance of the shafts.

Split cylindrical roller bearings are frequently used in the crankshafts of cold pilger machines.

For the bearing arrangement of work rolls in cold pilger machines, spherical roller bearings with a tapered bore and a special internal construction are used that are matched to the particular load conditions in these machines.

The roll bearing arrangement of cluster type cold rolling mills must ensure high surface quality and uniform thickness of the rolled strips. Multi-row cylindrical roller bearings or tapered roller bearings of various designs fulfil these requirements as back-up rollers.

|                      |                 |   |
|----------------------|-----------------|---|
| Special publications | TPI 148         | Rolling Bearing Arrangements for Converters   |
|                      | TPI 157         | Split Cylindrical Roller Bearings<br>for the Bearing Arrangements<br>of Rolling Mill Drive Shafts |
|                      | WL 17114        | Sealed FAG Spherical Roller Bearings  |
|                      | WL 17115        | Bearings and Service –<br>Productivity and Reliability for Metal Production                       |
|                      | WL 17200        | FAG Rolling Bearings in Rolling Mills   |
|                      | WL 41140        | FAG Rolling Bearings for Rolling Mills  |
|                      | WL 80154        | Four-row Tapered Roller Bearings,<br>Mounting Instructions  |
|                      | Publication PLS | The Bearing Solution for Strand Guide Rollers.  |



## Market sectors

### Bearing arrangements for the paper industry

Modern large paper machines contain a large number of rolling bearings of various types and sizes. Very high operational reliability is demanded of all bearings in order to prevent expensive downtime. In many cases, monitoring is carried out using the FAG Diagnostic Service, *Figure 11*.

Attention must also be paid to ensuring ease of mounting. There are also special requirements depending on the type of paper machinery and the subassemblies involved. In the wet section, the emphasis is on preventing ingress of water, while the bearings in the dry section must also be designed for high temperatures.

For suction box rolls in the wet section, spherical roller bearings with a conical or cylindrical bore and increased running accuracy are normally used.

Spherical roller bearings with lubrication holes in the inner ring are used if the outer ring rotates.

For very high speeds, spherical roller bearings with increased running accuracy and increased internal clearance are installed.



*Figure 11*  
Condition-based  
rolling bearing monitoring  
using FAG VibroCheck



An angular adjustment facility and high load carrying capacity are required in central press rolls, so spherical roller bearings are used, *Figure 12*.

Sophisticated labyrinth seals are required in the wet section in order to avoid ingress of water spray. In deflection compensating rolls, the roll sleeve rotates about the stationary roll axis. The roll sleeve is guided by spherical roller bearings, which may have special features including increased running accuracy, increased internal clearance and lubrication holes in the inner ring.

For directly driven rolls, triple ring bearings are sometimes used.

The axis is supported in the bearing inner ring.

The rotating intermediate ring connects the drive to the roll sleeve.



*Figure 12*  
Spherical roller bearings E1  
of X-life quality.  
With superior load carrying  
capacity,  
reduced operating temperature  
and very long operating life

The operating conditions in the dry section are characterised by high temperature and thermal expansion of the dryer roll. Spherical roller bearings are normally used as locating bearings. Up to a working width of approx. 5 m, spherical roller bearings are also used as non-locating bearings; these can be displaced axially in the housing in response to changes in the length of the dryer roll. For larger working widths, preference is given to self-aligning double row cylindrical roller bearings in normal plummer block housings, *Figure 13*, page 1112. The spherical roller bearings have an increased internal clearance C4 and the cylindrical roller bearings have an internal clearance to C5.





## Bearing arrangements in deep and surface mining

The machines used in deep and surface mining perform extremely arduous work.

The high load carrying capacity of the drill head bearing arrangement in tunnel-driving machines is ensured by cylindrical roller bearings and spherical roller bearings. The mass and tilting forces resulting from the offset drilling pressure are supported by single or double row radial cylindrical roller bearings or spherical roller bearings. The drilling pressure is supported by axial roller bearings.

In larger, compact machines, the drill head bearing arrangement is a ready-to-fit unit. It comprises either a double row tapered roller bearing or a triple ring axial/radial cylindrical roller bearing in which the crown gear can be integrated, *Figure 14*.

The bearing unit can withstand all load combinations of axial force, radial force and tilting moment.



*Figure 14*  
Axial/radial cylindrical roller bearing with integrated crown gear

The forces acting on the drive pinions of tunnel-driving machines are securely supported by one spherical roller bearing and one cylindrical roller bearing.

In conveying and lifting equipment, the main requirement is for standardised rolling bearings of all types, sizes and variants. Some applications require large or split bearings.



## Market sectors

The bucket wheel in bucket wheel excavators is supported by large spherical roller bearings (unsplit in the original equipment version, split in the aftermarket bearing version), *Figure 15*. These bearings support high loads and compensate, without constraining forces, the substantial misalignments that result from the large spacing between the locating and non-locating bearings.

Other demands placed on the bearing arrangement include:

- handling large fluctuations in operating temperature
- long rating life
- sealing against slurry, moisture, contamination and sand
- simple maintenance as well as low time and cost outlay in mounting and dismantling.



*Figure 15*  
Split spherical roller bearing

For gearbox bearing arrangements and for the bearing arrangement between the main gear and the hollow shaft flange, split cylindrical roller bearings are best suited due to the difficulty of access for bearing replacement.

One of many different drums in a belt installation is the drive drum. Spherical roller bearings allow compensation without constraining forces of the misalignments resulting from shaft deflections and deformation of the channels; these can fulfil the requirement for high operational reliability with low maintenance outlay. Specially developed housings are available for all bearing sizes.

The support rollers, connected either rigidly or in a jointed arrangement with each other, are normally fitted with deep groove ball bearings that are standardised, sealed and lubricated. Externally mounted seals prevent contamination entering the bearing arrangement.

|                      |          |   |
|----------------------|----------|---|
| Special publications | WL 21107 | Heavy-Duty Rolling and Plain Bearings for Mining, Processing, On- and Offshore Technology |
|                      | WL 43165 | Split FAG Spherical Roller Bearings   |
|                      | WL 90118 | Split FAG Plummer Block Housings of Series SNV.   |



## Market sectors

### Bearings for materials processing

Extreme operating and environmental conditions require robust bearing arrangements in crushers and mills, sieving and sorting machines as well as cylindrical rotary kilns, pelletising and sintering plants. Substantial shaft deflections and misalignments of the bearing positions must be compensated. High demands are made on the lubrication and sealing of the bearings.

Due to the high forces and harsh operation in crushers, spherical and cylindrical roller bearings are normally used.

In jaw crushers, also known as crosshead or double toggle crushers, spherical roller bearings support the crushing forces, the mass of the flywheels and the peripheral force of the drive via an eccentric shaft.

In gyratory or cone type crushers, the high radial forces are transmitted by two cylindrical roller bearings (outer bearings) and a spherical roller bearing (central bearing).

The axial masses are normally supported by an axial cylindrical roller bearing. Crusher cone and crusher shaft bearing arrangements with single and double row radial and axial cylindrical roller bearings or with large special tapered roller bearings are also in use.



*Figure 16*  
Large spherical roller bearings  
for tube mills

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For the rotating striking trains of single and twin shaft hammer crushers, spherical roller bearings are suitable due to the harsh operation and shaft deflection.

Large masses and shock type loads are characteristic of tube mills and also of hammer mills, impact crushers, rigid hammer crushers and impact wheel mills. Spherical roller bearings in specially developed housings are suitable for these requirements, *Figure 16*, page 1116. In roller grinding mills, the pressing, tilting and axial forces acting on the mill roller induce high radial and axial loads. These can be supported by a cylindrical roller bearing in combination with a spherical roller bearing or a tapered roller bearing unit in an X arrangement. In other roller grinding mills, each mill roller is supported by two tapered roller bearings mounted in an O arrangement.

Preferred bearing types for roller presses are spherical roller bearings and multi-row cylindrical roller bearings.

In order to support the particularly high shock type loads and radial accelerations of the exciter shaft in linear and free vibrators as well as eccentric screens, spherical roller bearings of series 223..-E1 and 223..-A of special designs are used, *Figure 17*.

These bearings are characterised by cages guided on the outer ring, restricted tolerances and increased radial internal clearance.

For special cases, spherical roller bearings of series 223..-E1A and 223..-A are also used.



*Figure 17*  
Spherical roller bearings  
for oscillating stresses



## Market sectors

The high combined loads at low speeds are supported in the radial support rollers of cylindrical rotary kilns by spherical roller bearings of series 241; they are located in split RLE or RLZ plummer block housings.

In axial support rollers, tapered roller bearings in an O arrangement have proven successful.

For the bearing arrangement of the pinion drive shaft, spherical roller bearings in specially developed plummer block housings of series RA are suitable.

The particular operating conditions in sintering and pelletising plan are best met by spherical roller bearings with a tapered bore on withdrawal sleeves. The bearings are mounted in split plummer block housings of series RA or SGB. Sealed double row cylindrical roller bearings can be considered for the bearing arrangements of pressure rollers, tapered roller bearings can be considered for the track wheels.

|                      |          |   |
|----------------------|----------|---|
| Special publications | TPI 197  | FAG Special Spherical Roller Bearings for Vibratory Machinery                               |
|                      | WL 21105 | Rolling Bearings in Grinding Mills  |
|                      | WL 21106 | Secure Handling of Severe Vibration, Special Spherical Roller Bearings in Vibrating Screens |
|                      | WL 21107 | Heavy-Duty Rolling and Plain Bearings for Mining, Processing, On- and Offshore Technology   |



## Bearing arrangements in the air handling sector

Bearing arrangements for compressors, fans and centrifuges must fulfil high requirements in relation to functional reliability and cost-efficiency. In many cases standard bearings are suitable, in some cases special bearings are required.

In order to minimise gap losses in compressors, the rolling bearing arrangement must have narrow guidance clearance. Some compressors run at very high speeds, so particular attention must be paid to the speed capacity of the bearings. Predominantly, four point contact bearings, cylindrical roller bearings and angular contact ball bearings are used.

For bearing arrangements in smaller fans, we offer special bearing units VRE3, *Figure 18*. Depending on the load conditions, six bearing arrangement variants are available.

The tubular form, unsplit plummer block housings are fitted with deep groove ball bearings, matched angular contact ball bearings and cylindrical roller bearings.



*Figure 18*  
Plummer block housing unit VRE3  
for fans



## Market sectors

In large fans and blowers, bearings with proven success include spherical roller bearings or self-aligning ball bearings in plummer block housings SNV, LOE or LOU. Grease or oil lubrication is used according to the operating conditions.

Separators and decanters are centrifuges that can be used to separate solid materials from liquids or mixtures of liquids with simultaneous centrifuging of solids. Separation methods are used, for example, in the food and drinks industry, in chemical engineering and in environmental protection.

The design of the bearing arrangement must often take account of vibrations, external temperatures and special lubrication requirements. Selection of suitable bearings is made considerably easier by use of the calculation software BEARINX®.

In many cases, cost-effective standard bearings can be used such as angular contact ball bearings and cylindrical roller bearings with sheet steel cages. Through the use of BEARINX® for design work, it is possible to achieve a high level of functional reliability even taking account of extreme operating conditions.

|                      |          |   |
|----------------------|----------|---|
| Special publications | WL 22102 | Bearing Technology for Compressors, Fans and Centrifuges. |
|----------------------|----------|---|

## Energy Bearing arrangements in drilling and conveying plant

Drilling and conveying plant for oil and gas include various machines such as Crown Block, Crown Compensator, Top Drive and flushing pumps. These machines are fitted with a large number of standard and special bearings. These bearings must often withstand severe shocks and heavy mass forces. With its comprehensive product range, Schaeffler offers solutions matched to the application for both the onshore and offshore sectors.

For example, the rotary tables are fitted with large special axial angular contact ball bearings. They support the large mass of the drill string. In addition, adjacent parts such as spacer sleeves and flanges are integrated in some cases.

In flushing pumps (Triplex pumps), strongly alternating loads occur in the crank drive. In order to support these loads, large special cylindrical roller bearings are used for the big end and double row needle roller bearings or four-row cylindrical roller bearings in the crosstail.

The drill string is raised and lowered by means of pulley blocks with a large number of cable sheaves. The resulting load is transmitted by double row tapered roller bearings with adjusted axial internal clearance. Cable sheaves are also used in the so-called Crown Compensator application that compensates the tidal range (amplitude of the tides) for drilling vessels and wave movements in deep sea drilling.



*Figure 19*  
Rolling bearings  
for drilling and conveying plant



## Market sectors

### **Bearing arrangements in power stations**

Power stations are industrial plant for the provision of electrical and in some cases also thermal power.

These highly complex installations play an important role in the consumption of economic and ecological resources, which will increase in the coming decades.

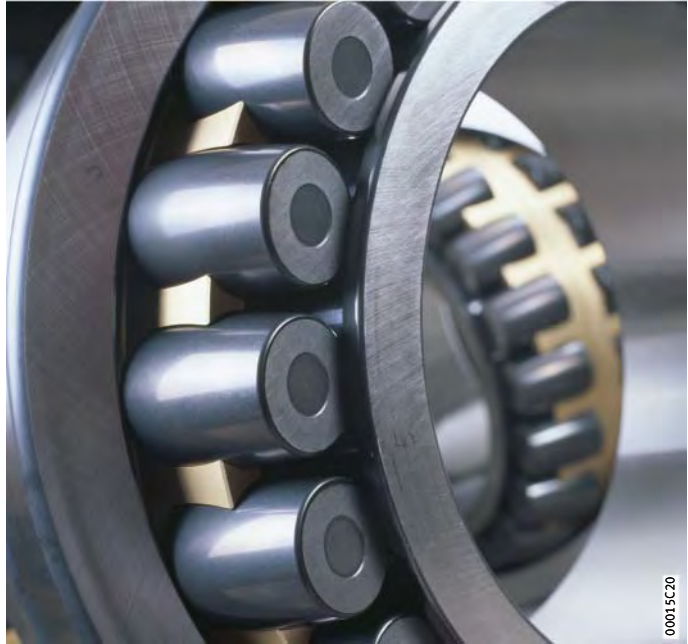
Schaeffler Technologies is one of the leading suppliers of rolling and plain bearings, including those for applications in power stations. Under the brands FAG and INA, Schaeffler offers a large number of products and services for machinery in the energy generation sector. The standard bearings and customer-specific special bearings from Schaeffler have proved themselves under the most challenging application conditions, for example in typical bearing positions in coal-fired power stations such as impact wheel and bowl mills or air preheaters. Large masses and shock type loads are characteristic of impact wheel mills.

Spherical roller bearings are highly suitable for these requirements. In vertical mills, the pressing, tilting and axial forces acting on the mill roller induce high radial and axial loads.

These can be supported by a cylindrical roller bearing in combination with a spherical roller bearing or a tapered roller bearing unit in an X arrangement.

The air preheater recovers heat from the flue gas, transfers this to fresh air brought in through ventilators and thus achieves preheating of the combustion air.

A distinction is made here between horizontal and vertical air preheaters. Due to the large masses in conjunction with low speeds, the radial and axial spherical roller bearings used here normally run in the mixed friction range.



*Figure 20*  
Spherical roller bearings  
for power stations



## Market sectors

### Consumer products

Rolling bearings are present almost everywhere in our environment: at home, at work and in leisure.

In most cases, however, the bearings are simply not noticed.

### Bearings for consumer products

Rolling bearings in electrical devices are found in household appliances, in communications and entertainment equipment and in DIY tools as well as in sports equipment and medical technology.

In household appliances, the requirement is normally for operation with little noise and little vibration.

In order that the bearings achieve high cost-efficiency and reliability, there is a focus on long operating life and low maintenance requirements. For small devices, simple, sealed deep groove ball bearings lubricated for life are generally preferred in order to meet these requirements.

In order to avoid damage through passage of current, current-insulated bearings are available, *Figure 21*.

In such deep groove ball bearings, cylindrical roller bearings and tapered roller bearings of the design J20, an oxide ceramic coating is applied to the outside surface and end faces of the outer ring.

Alternatively, hybrid bearings with ceramic rolling elements can be used. Hybrid deep groove ball bearings (prefix HC) with silicon nitride balls are available by agreement.

In order to detect the speed and direction of rotation in electrical devices, deep groove ball bearings with an integral sensor are available.

INA/FAG rolling bearings have also proven themselves in modern sports equipment. In motorcycles, waterjets and bob skis, their speed capacity and quiet running are particularly significant.

Low bearing friction is important where the sportsman works using muscle power, for example in bicycles and inline skates.



*Figure 21*  
Current-insulated rolling bearings

|                      |               |  |
|----------------------|---------------|--|
| Special publications | TPI 206       | Current-insulated Rolling Bearings Prevent Damage due to the Passage of Electrical Current |
|                      | TI WL 43-1206 | FAG Deep Groove Ball Bearings with Integral Sensor   |
|                      | TI WL 43-1210 | FAG Hybrid Deep Groove Ball Bearings   |
|                      | TPI 152       | Flanged Housing Units for Large Electrical Machinery.                                      |



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