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ROLLING BEARING GENERAL CATALOGUE C&U CO., LTD.

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C&U COMPANY LIMITED

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ROLLING BEARING
GENERAL CATALOGUE

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Introduction

As the general catalogue of C&U rolling bearings is being issued, we'd like to express our sincere respect and gratitude to the customers of C&U Group. During the compilation of this catalogue, we have received good suggestions from the experts of bearing industry and much support from many peers and clients. We are very grateful for their selfless help.

Rolling bearings are widely used mechanical parts. Specialized production in large quantity has been realized in main industrial countries of the world, therefore the standardization, serialization and generalization of rolling bearings have been improved gradually. Along with the rapid development of science and technology, the design and application theory, manufacture level and material science are also being developed continually in bearing field. Various standards of rolling bearings are being revised and updated. Since 1994, China has adopted the new international bearing number rules.

It is important to correctly select and properly use rolling bearings to achieve high performance, low noise, long life and high reliability. Therefore, we compiled and revised this catalogue by collecting and referring to the latest information at home and abroad, and integrated the latest research achievements of C&U in recent years. A lot of additions and modifications are made in this revised catalogue, trying to provide customers with more practical and more detailed bearing selection manual.

This general catalogue includes the most commonly used standard rolling bearings and accessories, which can meet most of the needs of various industrial equipment manufacturers and maintenance users.

The data listed in this catalogue are revised according to the current processing equipment and process technology of C&U. Some of the data may differ from the original catalogue due to the design update, technology development and optimization of calculation method. However, this revised catalogue shall be the one that prevails.

The units used in this general catalogue conform to ISO (International Standards Organization) 10000: 1992 and SI (International System of Units).

Due to technical development, product upgrading and other reasons, the contents of this catalogue may subject to change without prior notice.
However, it will be appreciated if you could contact C&U when any inaccuracy or inappropriateness is found herein.
Telephone: 400-820-3393

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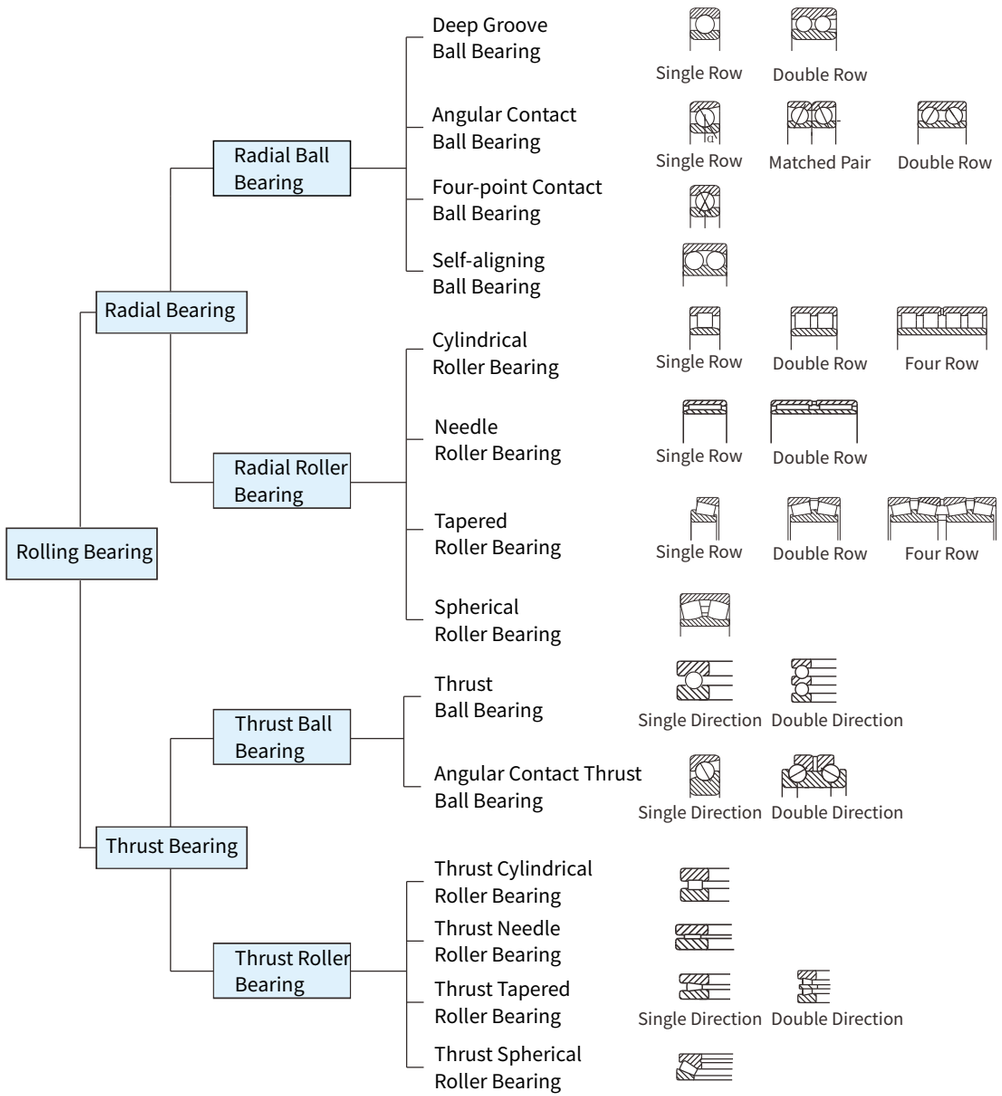
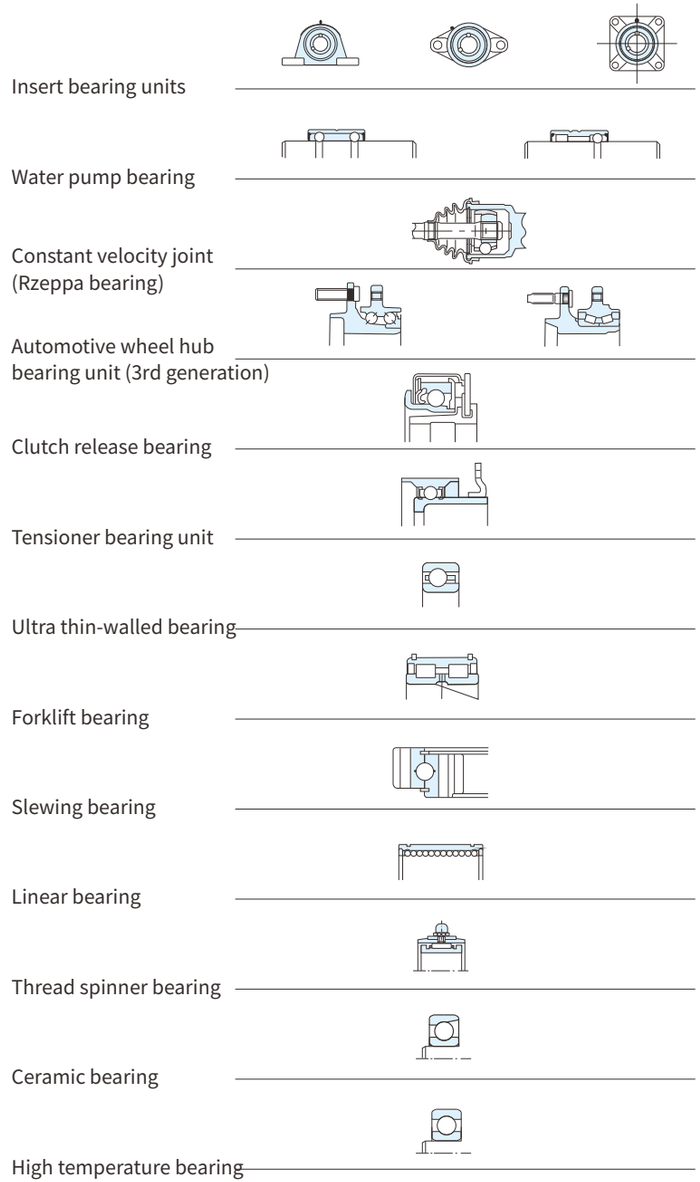


Bearings for Other Applications



1. Structures, classifications and characteristics of rolling bearings

1.1 Structure of rolling bearings

Most rolling bearings are composed of inner ring, outer ring, rolling elements (ball and roller) and cage. For sealed bearings, they also include seal, shield and lubricant.

● Inner ring and outer ring

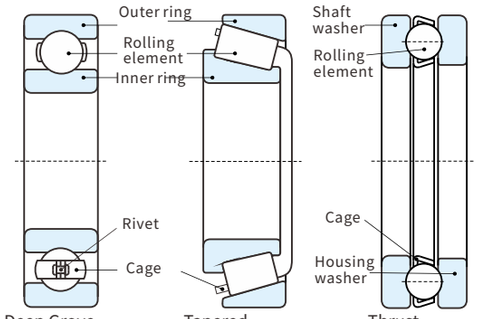
The inner raceway, outer raceway and rolling elements form an organic rotating unit, with the cage separating the rolling elements and enabling them to move along the correct track.

● Rolling element

Rolling elements can be divided into balls and rollers according to their shapes, while rollers can be further divided into cylindrical rollers, tapered rollers, needles and spherical rollers.

● Cage

The cage does not bear the load directly. It is mainly used to maintain the correct position and interval of the rolling elements and to prevent the rolling elements from falling off during installation. Cage design can be divided into stamping cage, solid cage, plastic cage and so on.



1.2 Classification of rolling bearings

Rolling bearings are divided into ball bearings and roller bearings according to the shape of the rolling element.

Ball bearings are divided into deep groove ball bearings and radial thrust ball bearings according to the ring structure.

Roller bearings are divided into cylindrical roller bearings, tapered roller bearings, needle roller bearings, spherical roller bearings, etc. according the roller shape.

According to the load direction rolling bearings can be divided into: radial bearings carrying radial load and thrust bearings carrying axial load.

According to the number of rolling element rows, they can be divided into single-row, double-row, three-row, four-row and multi-row bearings.

According to whether inner or outer rings are separable, they can be divided into separable and non-separable bearings.

There are also bearings for special purposes: bearings for railway vehicles, ball screw bearings, precision spindle bearings, etc.

1.3 Characteristics of rolling bearings

1.3.1 Advantages of rolling bearings

Compared with sliding bearings, rolling bearings have the following advantages:

● Small start-up friction coefficient

● Unified international standards and specifications which enables the products to be interchangeable easily

● Easy lubrication, less lubricant consumption, with one set of bearings bearing both radial and axial load

● It can be used in high and low temperature occasions. The bearing support rigidity can be increased by adjusting the preload.

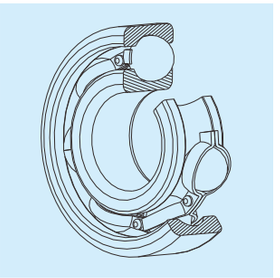
1.3.2 Characteristics of radial bearings and thrust bearings

Generally speaking, when the bearing contact angle is less than 45°, the radial load capacity is larger, then the bearing is classified as radial bearing; when bearing contact angle is more than 45°, the axial load capacity is larger, then the bearing is classified as thrust bearing; when the contact angle is between 0° and 45°, bearing can withstand combined radial and axial load, then it can be classified as composite bearing.

1.3.3 Standard bearings and non-standard bearings

Bearing dimensions and shapes are formulated according to international or national standards and can be interchangeable. Sometimes we need to design special bearings according to customer needs. These bearings are defined as non-standard bearings.

1.3.4 Single row deep groove ball bearings



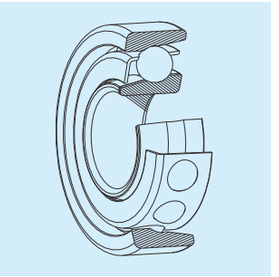
Single row deep groove ball bearings are divided into open deep groove ball bearings, deep groove ball bearings with shields, deep groove ball bearings with seals, deep groove ball bearings with snap rings on the outer ring, etc.

Single row deep groove ball bearings mainly bear radial load, but it can also bear a certain amount of axial load.

The cages are generally made of stamped steel ribbons, and nylon cages have been widely used.

Deep groove ball bearings with seals or dust covers have been standardized.

1.3.5 Angular contact ball bearings



The contact points between the ball and the inner and outer ring form an angle with the radial plane (hereinafter referred to as contact angle). This type of bearing usually has three contact angles: 15°, 25° and 40°.

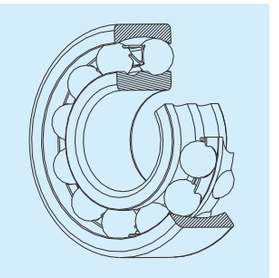
Double or combined angular contact ball bearings can bear bidirectional axial load. The greater the contact angle, the greater the bearing capacity to withstand axial load. Single row angular contact ball bearings can not be used to support axial loads in both directions.

High-precision and high-speed bearings usually adopt 15° contact angle.

Angular contact bearings are usually used in pairs.

Four-point contact ball bearings can bear bidirectional axial load, which is a special structure of radial thrust ball bearings.

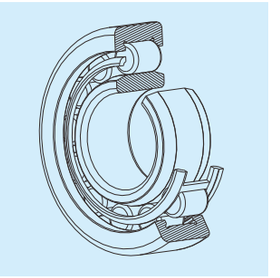
1.3.6 Self-aligning ball bearings



The inner ring of the self-aligning ball bearing has two raceways, and the outer raceway is spherical. The curvature center of the spherical surface coincide with that of the bearing axis. The inner ring, ball and cage can tilt relatively freely to the outer ring. The outer raceway has automatic self-aligning performance.

Self-aligning ball bearing has two structures: cylindrical bore and tapered bore. The material of cage is made of steel or synthetic resin, etc.

1.3.7 Cylindrical roller bearings



Cylindrical roller bearings mainly support radial loads. Since the rolling body is cylindrical, it has a higher load capacity. The rollers are guided by the inner and outer ring's rib. The inner and outer rings can be installed on the shaft or in the bearing housing with tight fit respectively. If there is no rib, the roller can move freely along the axis.

Cylindrical roller bearings are especially suitable for "free end" bearings, which can withstand lighter axial load when there is a rib.

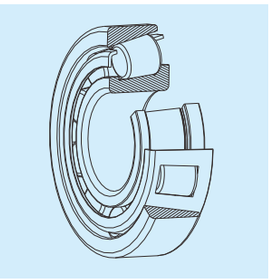
According to different usage, cylindrical roller bearings can be divided into E-type and EC-type design, so as to improve the bearing's radial and axial load carrying capacity.

Cylindrical roller bearings have the following types:

Single row: N, NU, NJ, NF, NUP, etc.

Double row: NN, NNF, NNU, etc.

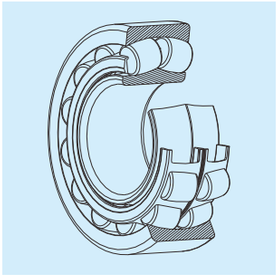
1.3.8 Tapered roller bearings



In the design of tapered roller bearings, the conical vertices of the inner and outer rings and the rolling body intersect at the same point on the center line of the bearing. Therefore, the rolling body makes pure rolling motion on the raceway surface, relying on the synthetic force from the raceway of inner and outer ring, and guided by the big rib of inner ring.

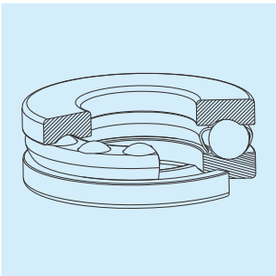
Tapered roller bearings are suitable for radial load, axial load and combined radial and axial load. The greater the load capacity, the greater the contact angle, the greater the axial load capacity. Even under pure radial load, there will be axial force, so these bearings are usually used in pairs with two sets of bearings.

1.3.9 Spherical roller bearings



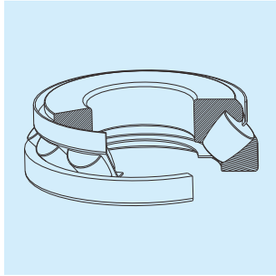
The outer ring of spherical roller bearing is barrel-shaped, with double row inner ring raceway and spherical roller body (also known as drum roller). The center of the outer ring raceway surface coincides with the bearing center, so it has automatic alignment performance. Even if there is installation error or deflection between the shaft and bearing housing, the inner and outer rings can be used when misalignment exists between the bearing rings.
In addition to cylindrical bores, tapered bore bearings are also widely used, which can be differentiated with standard bearings by an additional symbol "K" on its designation, and can be installed using adapter sleeve or withdrawal sleeve.
Since this kind of bearings can bear higher load, they are mostly used in industrial machinery. When the bearing is subject to axial load, the axial force exerted on the roller will disappear, thus causing the sliding of the roller train.
The structure of spherical roller bearing mainly includes: CA, CC, YA, V, TN, M, E, sealed type, etc.

1.3.10 Thrust ball bearings



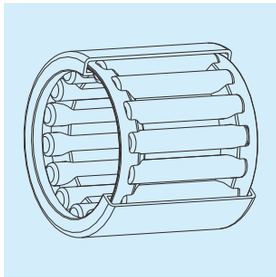
Thrust ball bearings can only bear axial load. This kind of bearing has low rotation speed and special lubrication requirements.
The ring fitted to the shaft is called "shaft washer".
The ring fitted to the housing is called "housing washer"
Thrust ball bearings can be divided into two types according to the force mode: one-way thrust ball bearings and two-way thrust ball bearings.

1.3.11 Spherical thrust roller bearings



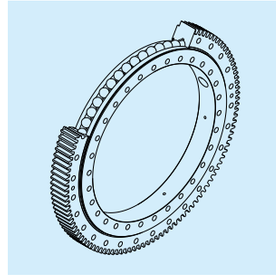
Rollers of this kind of bearing are barrel-shaped. Since the raceway in the housing washer is spherical, the bearing has self-aligning ability. Barrel-shaped roller are arranged diagonally, therefore the deflection of the axle is permitted.
Spherical thrust roller bearings have very large axial load bearing capacity, which can bear axial load as well as a certain amount of radial load.
The main type of spherical thrust roller bearing cage is machined copper cage.

1.3.12 Needle roller bearings



The roller of needle roller bearing is long and thin, with a maximum diameter of 5 mm and a length of 3 to 10 times longer than the diameter. Although the cross-section of needle-roller bearing is narrow, its load is larger than that of ordinary bearings with the same size ratio. Because of the large number of needles, it has large rigidity and small inertia, which is suitable for swinging motion.
Needle roller bearings mainly include the following types:
Needle roller bearings with pressed outer ring made of special alloy steel sheet; needle roller bearings with solid outer ring which is made of cutting rings; cage and needle assembly without rings and needle roller bearings for gyro wheels.
The needle roller bearing cage is generally made of pressed steel sheet cage.

1.3.13 Slewing bearings



Slewing bearing structure is different from other rolling bearings. It mainly bears axial load and part of radial load, and can also bear large tilting torque.
Slewing bearing is divided into single row four-point contact ball type, double row four-point contact ball type, single row cross-roller type, double row cross-roller type, etc.

2. Boundary dimension and basic code of rolling bearings

2.1 Boundary dimension

The main dimensions of bearings refer to the inner diameter (d), outer diameter (D), width(B) or height (H) and chamfer size (r), etc., which are required when mounting the bearings onto the shaft or into the housing. See Fig. 2.1 ~ 2.3.

For the main dimension series, the International Standardization Organization (ISO) has established international standards (ISO 15, ISO 355 and ISO 104) to ensure the exchangeability and economical efficiency internationally. Corresponding specifications have been made for the main size of radial bearings, tapered roller bearings and thrust bearings, i.e. the inner diameter, outer diameter, width and chamfer size of bearings have been serialized and standardized.
The standards of China also adopt the standard specifications of ISO. The corresponding standard numbers are GB/T273.1, GB/T273.2 and GB/T273.3. The chamfer assembling standard is GB/T274.
Diameter series refer to the dimensions series of outer diameter of the bearings with the same inner diameter. The outer dimension series includes 7, 8, 9, 0, 1, 2, 3, 4, which are sequentially incremental.
Width series refers to the width dimension of the bearings with the same diameter series. The width dimension includes 8, 0, 1, 2, 3, 4, 5, 6, which are sequentially incremental

The height series of thrust bearings correspond to the width series of radial bearings, including four increasing series of height dimensions, 7, 9, 1, 2, etc. See Table. 2.1.

The bearing dimension series numbers consist of the width (height) series codes and the diameter series codes. Their relations are illustrated in Fig. 2.4 and Fig. 2.5.

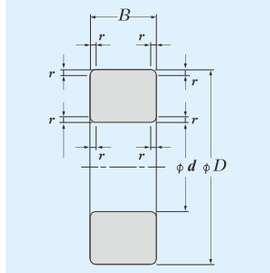


Fig. 2.1 Radial bearing (excluding taper roller bearing)

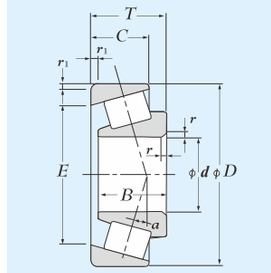


Fig. 2.2 Tapered roller bearing

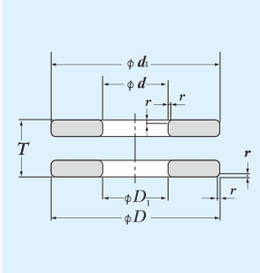


Fig. 2.3 Single direction thrust bearing

Table 2.1 Dimension series

	Dimension series				
	Diameter series (outside dimension)		Width series (width)	Height series (height)	Reference figure
Radial bearing (excluding tapered roller bearing)	No.	7, 8, 9, 0, 1, 2, 3, 4	8, 0, 1, 2, 3, 4, 5, 6	——	Fig. 2.4
	Dimension	Small ←→ Large	Small ←→ Large		
Tapered roller bearing	No.	9, 0, 1, 2, 3	0, 1, 2, 3, 4	——	——
	Dimension	Small ←→ Large	Small ←→ Large		
Thrust Bearing	No.	0, 1, 2, 3	——	7, 9, 1, 2	Fig. 2.5
	Dimension	Small ←→ Large		Small ←→ Large	

For metric design taper roller bearings, ISO355 specifies that the diameter series of the standard inner diameter are represented by A, B, C, D, E, F, and G, with outer diameter increasing sequentially, while width dimension is incrementally represented by A, B, C, D and E. In addition, it also specifies the contact angle series of 1, 2, 3, 4, 5, 6, 7 to be sequentially incremental. China' s national standard specifies diameter series and width series are both 0, 1, 2, and 3.

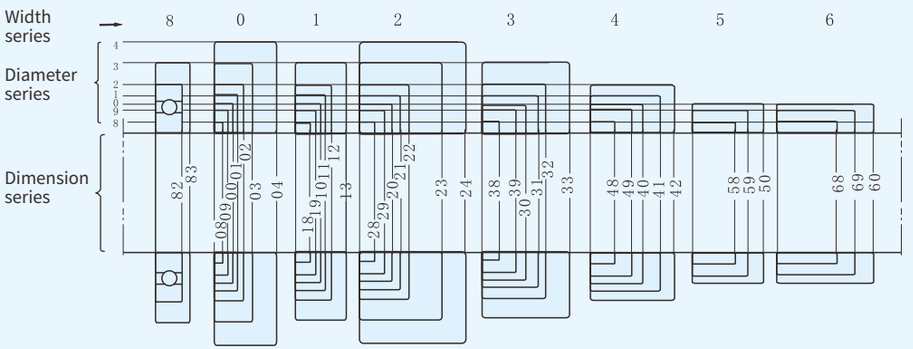


Fig. 2.4 Dimension series of radial bearings (excluding tapered roller bearings)

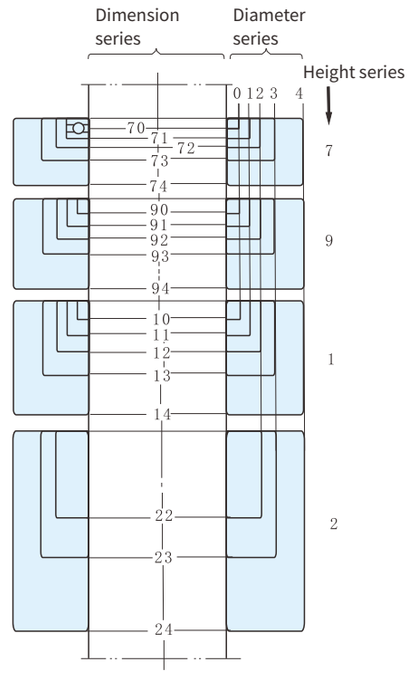


Fig. 2.5 Dimension series of thrust bearings

2.2 Structure of bearing code

The basic code of rolling bearings is the basis of bearing codes, which describes bearing type, structure and size, while prefix code and suffix code are supplementary numbers added upon the basic numbers when there is change to the shape, dimension, tolerance or technical requirements. See Table 2.2 for arrangement rules for bearing codes

2.3 Basic code

Except needle roller bearings, the basic code of the bearing dimension that conforms to any of GB/T273.1, GB/T273.2, GB/T273.3 and GB 3882 will include bearing type code, dimension series code and inner diameter code.

Display of basic code:

In the basic code, when the bearing type code is represented by letters, there shall leave a space between the bearing dimensional series code, inner diameter code or mounting fit number.

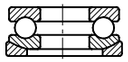
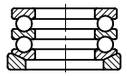
For example: NU 2300

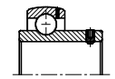
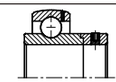
The generally used bearing types, dimension series code and bearing basic codes composed of bearing type code and dimension series code are shown in Table 2.3.

Table. 2.2 Arrangement rules of bearing codes

	Prefix code	Basic number			Suffix code							
					1	2	3	4	5	6	7	8
Example	Whole set bearing component	Type code	Dimension series code	Inner diameter code	Internal structure	Seal/shield configuration	Cage and its material	Bearing material	Tolerance class	Clearance	Arrangement	Other
6204-2RZ/P53		6	(0) 2	04		2RZ			P5	C3		

Table 2.3

Bearing Type	Drawing	Type code	Dimension series code	Combined code	Standard
Double row angular contact ball bearing		(0) (0)	32 33	32 33	GB/T 296
Self-aligning ball bearing		1 (1) 1 (1)	(0) 2 22 (0) 3 23	12 22 13 23	GB/T 281
Spherical roller bearing		2 2 2 2 2 2 2 2	13 22 23 30 31 32 40 41	213 222 223 230 231 232 240 241	GB/T 288
Spherical thrust roller bearing		2 2 2	92 93 94	292 293 294	GB/T 5859
Tapered roller bearing		3 3 3 3 3 3 3 3 3 3	02 03 13 20 22 23 29 30 31 32	302 303 313 320 322 323 329 330 331 332	GB/T 297
Double row deep groove ball bearing		4 4	(2) 2 (2) 3	42 43	—
Thrust ball bearing		5 5 5 5	11 12 13 14	511 512 513 514	GB/T 301
Double direction thrust ball bearing		5 5 5	22 23 24	522 523 524	GB/T 301
Thrust ball bearing with spherical housing washer		5 5 5	1) 32 33 34	532 533 534	—
Double direction thrust ball bearing with spherical housing washer		5 5 5	2) 42 43 44	542 543 544	—
Deep groove ball bearing		6 6 6 6 16 6 6 6 6	17 37 18 19 (0) 0 (1) 0 (0) 2 (0) 3 (0) 4	617 637 618 619 160 60 62 63 64	GB/T 276 GB/T 4221
Angular contact ball bearing		7 7 7 7 7	19 (1) 0 (0) 2 (0) 3 (0) 4	719 70 72 73 74	GB/T 292

Bearing Type	Drawing	Type code	Dimension series code	Combined code	Standard
Thrust cylindrical roller bearing		8 8	11 12	811 812	GB/T 4663
Cylindrical roller bearing without rib on outer ring		N N N N N N	10 (0)2 22 (0)3 23 (0)4	N10 N2 N22 N3 N23 N4	GB/T 283
Cylindrical roller bearing without rib on inner ring		NU NU NU NU NU NU	10 (0)2 22 (0)3 23 (0)4	NU10 NU2 NU22 NU3 NU23 NU4	GB/T 283
Cylindrical roller bearing with single rib on inner ring		NJ NJ NJ NJ NJ	(0)2 22 (0)3 23 (0)4	NJ2 NJ22 NJ3 NJ23 NJ4	GB/T 283
Cylindrical roller bearing with single rib on inner ring and loose rib		NUP NUP NUP NUP	(0)2 22 (0)3 23	NUP2 NUP22 NUP3 NUP23	GB/T 283
Cylindrical roller bearing with single rib on outer ring		NF NF NF	(0)2 (0)3 23	NF2 NF3 NF23	GB/T 283
Double row cylindrical roller bearing without rib on outer ring		NN	30	NN30	GB/T 285
Double row cylindrical roller bearing without rib on inner ring		NNU	49	NNU49	GB/T 285
Insert bearing unit with screw locking		UC UC	2 3	UC2 UC3	GB/T 3882
Insert bearing unit with eccentric collar		UEL UEL	2 3	UEL2 UEL3	GB/T 3882
Insert bearing unit with tapered bore		UK UK	2 3	UK2 UK3	GB/T 3882
Four-point contact ball bearing		QJ QJ	(0)2 (0)3	QJ2 QJ3	GB/T 294

Note: The "( )" in the table denotes that the number is omitted.
1) Dimension series 12, 13, 14, are respectively displayed as 32, 33, 34.
2) Dimension series 22, 23, 24, are respectively displayed as 42, 43, 44.

2.4 Dimension series code

The bearing dimension series codes consist of width (height) series and diameter series. See Table 2.4 for the dimension series of radial bearings and thrust bearings.

Table 2.4

Diameter series code	Radial bearing								Thrust bearing			
	Width series code								Height series code			
	8	0	1	2	3	4	5	6	7	9	1	2
	Dimension series code											
7	—	—	17	—	37	—	—	—	—	—	—	—
8	—	08	18	28	38	48	58	68	—	—	—	—
9	—	09	19	29	39	49	59	69	—	—	—	—
0	—	00	10	20	30	40	50	60	70	90	10	—
1	—	01	11	21	31	41	51	61	71	91	11	—
2	82	02	12	22	33	42	52	62	72	92	12	22
3	83	03	13	23	33	—	—	—	73	93	13	23
4	—	04	—	24	—	—	—	—	74	94	14	24
5	—	05	—	—	—	—	—	—	—	95	—	—

2.5 Inner diameter code

The space of standard inner diameter dimension is shown in Table 2.5.
The inner diameter code representing bearing nominal inner diameter are shown in Table 2.6.

Table 2.5 The dimension space rule of standard inner diameter

Bearing nominal inner diameter d (mm) Over	Up to	Standard inner diameter (mm)	Base
——	1.0	0.6	——
1.0	3.0	1, 1.5, 2, 2.5	0.5mm space
3.0	10	3, 4, ⋯, 9	1mm space
10	20	10, 12, 15, 17	——
20	35	20, 22, 25, 28, 30, 32	Normal dimension R20 series
35	110	35, 40, 45, ⋯, 105	5mm space
110	200	110, 120, 130, ⋯, 480	10mm space
200	500	200, 220, 240, ⋯, 480	20mm space
500	2500	500, 530, ⋯, 2500	Normal dimension R40 series

Table 2.6 Inner diameter code

Bearing nominal inner diameter/mm		Inner diameter code	Example
0.6~10 (non-integer)		Directly denoted by nominal inner diameter in mm and separated by "/" from dimension series	Deep groove ball bearing 619/2.5 d=2.5mm
1~9 (integer)		Denoted by nominal inner diameter in mm, while for deep groove ball bearings and angular contact ball bearing's 7, 8, 9 diameter series, inner diameter and dimension series code are separated by "1".	Deep groove ball bearing 625, 619/5 d=5mm
10~17	10 12 15 17	00 01 02 03	Deep groove ball bearing 6200 d=10mm
20~480 excluding(22, 28, 32)		If the quotient is a single number after nominal inner diameter is divided by 5, "0" shall be added on the left, such as 08.	Spherical roller bearing 23208 d=40mm
⩾ 500 and 22, 28, 32		Directly denoted by nominal inner diameter in mm and separated by "/" from dimension series	Spherical roller bearing 230/500 d= 500mm

2.6 Prefix code

The prefix code of rolling bearings are represented by letters. See Table 2.7 for the number and their meanings.

2.7 Suffix code

The suffix codes of rolling bearings are expressed by letters (or numbers).
Suffix codes are on the right side of the basic number, and there is a one-character space from the basic number (excluding codes with "- " or " / "). When there are many changed items and several groups of suffix codes, they shall be arranged according to the order shown in Table 2.2;
If changed items are after Group 4 (including Group 4), "/" is used before its code to separate it from the previous code;
E.g.: 6203-2Z/P6
If changed items include two groups after Group 4, the meanings of the number or letter might be confusing, so there should be a one-character space between the codes.
E.g.: 6203-2Z/P6 V1

Table 2.7 Prefix codes

Code	Meaning	Example
L	Separable inner ring or outer ring of separable bearing	LNU 205
R	Bearing without separable inner and outer rings (only appliable to NA type needle roller bearing)	RNU 205
K	Roller and cage assembly	K 81105
WS	Thrust cylindrical roller bearing shaft washer	WS 81105
GS	Thurst cylindrical roller bearing housing washer	GS 81105
F	Radial ball bearings with flanged outer ring (only applied to d≤10mm)	F 619/5
KOW-	Thrust bearing without shaft washer	KOW- 51105
KIW	Thrust bearing without housing washer	KIW- 51106
LR	Bearings with separable inner ring or outer ring and rolling element	—

2.7.1 The internal structure codes are shown in Table 2.8

Table 2.8 Internal structure codes

Code	Meaning	Example
A B C D E	1) Represent internal structure change 2) Represent standard design whose meanings change along with different types and structures	**B** Angular contact ball bearing-nominal contact angle a= 40°, 7205 B Tapered roller bearing-contact angle increased 32305 B **C** Angular contact ball bearing-nominal contact angle a=15°, 7005 C Spherical roller bearing C type 23122C CA type 23022 CA/W33 CC type 22205 CC **E** Reinforced type NU 207E
AC	Angular contact ball bearing Nominal contact angle a= 25°	7210 AC
D	Split bearing	K 50×55×20 D
ZW	Needle roller cage component Double row	K 50×55×20 ZW

2.7.2 Seals, shields and outer ring groove codes are shown in Table 2.9

Table 2.9 Seal, dust proof and outline change

Code	Example
K	1210 K, self-aligning ball bearing with tapered bore
	23220 K, spherical roller bearing with tapered bore
K30	24122 K30, spherical roller bearing with tapered bore (1:30)
R	30307 R, tapered roller bearing with flanged outer ring
N	6210 N, deep groove ball bearing with snap ring groove on outer ring
NR	6210 NR, deep groove ball bearing with snap ring groove and snap ring on outer ring
-RS	6210- RS, deep groove ball bearing with frame rubber seal on one side (contact type)
-2RS	6210-2RS, deep groove ball bearing with frame rubber seals on both sides (contact type)
-RZ	6210-RZ, deep groove ball bearing with frame rubber seal on one side (non-contact type)
-RZ	6210-2RZ, deep groove ball bearing with frame rubber seals on both sides (non-contact type)

Code	Example
-Z	6210-Z, deep groove ball bearing with shield on one side
-2Z	6210-2Z, deep groove ball bearing with shield on both sides
-RSZ	6210- RSZ, deep groove ball bearing with frame rubber seal (contact type) on one side and shield on the other side
-RZZ	6210- RZZ, deep groove ball bearing with frame rubber seal (non-contact type) on one side and shield on the other side
-ZN	6210-ZN, deep groove ball bearing with shield on one side and snap ring groove on the other side of the outer ring
-2ZN	6210-2ZN, deep groove ball bearing with shields on both sides, and snap ring groove on the outer ring
-ZNR	6210-ZNR, deep groove ball bearing with shield on one side and snap ring (groove) on the other side of outer ring
-ZNB	6210-ZNB, deep groove ball bearing with shield and snap ring groove on the same side
-U	53210 U, thrust ball bearing with spherical housing washer

2.7.3 Cage structure and material code according to Table 2.10

Table 2.10

Code	Meaning
a) Cage material	
F	Steel, nodular cast iron or powder metallurgic solid cages, numbers added to represent different materials
F1	Carbon steel
F2	Graphitic steel
F3	Nodular cast iron
F4	Powder metal
Q	Bronze solid cages, numbers added to represent different materials
Q1	Ferro-aluminum, manganese, bronze
Q2	Ferro-silicon, zinc, bronze
Q3	Tantnickel bronze
Q4	Aluminum bronze
M	Brass solid cage
L	Light alloy solid cage, numbers added to represent different materials
L1	LY11CZ/Duralumin 11
L2	LY12 CZ/Duralumin 12
T	Phenolic aldehyde laminated cloth tube solid cage
TH	Glass fiber reinforcement phenolic resin cage (basket type)
TN	Engineering plastic molded cages, numbers added to represent different materials
TN1	Nylon
TN2	Polysulfone
TN3	Polyimide
TN4	Polycarbonate
TN5	Polyformaldehyde
J	Steel ribbon pressed cages, numbers added to represent different materials
Y	Copper ribbon pressed cages, numbers added to represent different materials
SZ	Cages are made of spring wire or spring
V	Full complement (without cage)

Code	Meaning
b) Cage structure type and surface treatment	
H	Self-locking pocket cage
W	Weld cage
R	Riveted cage (mostly used for large bearings)
E	Phosphated treatment cage
D	Carbonitrided cage
D1	Carbonizing cage
D2	Nitriding cage
C	Coated cages (C1: silvering)
A	Outer ring guide
B	Inner ring guide
P	Window shape cages with broaching or punching guided by inner ring or outer ring
S	Guide surface with lubricating groove

2.7.4 Codes of tolerance classes

Tolerance classes codes are shown in Table 2.11.

Table 2.11 Tolerance class codes

Code comparison		Example	
New standard	Old standard	New standard	Old standard
/P0	G	Deep groove ball bearing whose tolerance class is 0	203
/P6	E	Deep groove ball bearing whose tolerance class is 6	E 203
/P6x	Ex	Taper roller bearing whose tolerance class is 6X	Ex 7210
/P5	D	Deep groove ball bearing whose tolerance class is 5	D 203
/P4	C	Deep groove ball bearing whose tolerance class is 4	C 203
/P2	B	Deep groove ball bearing whose tolerance class is 2	B 203

2.7.5 Clearance code

Clearance codes are shown in Table 2.12.

Table 2.12 Clearance code

Code comparison		Example	
New standard	Old standard	New standard	Old standard
/C1	1	NN 3006 K/C1, Double row cylindrical roller bearing whose radial clearance belongs to Group 1	1G 3282106
/C2	2	6210/C2- Deep groove ball bearing whose radial clearance belongs to Group 2	2G 210
——	——	6210, Deep groove ball bearing whose radial clearance belongs to Group 0	210
/C3	3	6210/C3, Deep groove ball bearing whose radial clearance belongs to Group 3	3G 210
/C4	4	NN 3006K/C4, Double row cylindrical roller bearing with tapered bore whose radial clearance belongs to Group 4	4G 3182106
/C5	5	NNU 4920K/C5, Double row roller bearing with tapered bore and without rib on inner ring whose radial clearance is Group 5	5G 4382920

Note: When the tolerance class and clearance are displayed at the same time, it can be simplified by adding the clearance group number to tolerance class (Group 0 is omitted).
For example: P53=P5+C3 means that the bearing tolerance class is P5, and radial clearance is Group 3.

2.7.6 Vibration code

Vibration codes are shown in Table 2.13.

Table 2.13 Vibration code

Code	Meaning	Example
/Z	Bearing's vibration acceleration level represents different extremums. Vibration acceleration extremums conforming to Group Z1 according to standards Vibration acceleration extremums conforming to Group Z2 according to standards Vibration acceleration extremums conforming to Group Z3 according to standards Vibration acceleration extremums conforming to Group Z4 according to standards	6204/ Z1 6204-2RS/ Z2
/V	Bearing's vibration velocity level represents different extremums. Vibration velocity extremums conforming to Group V1 according to standards Vibration velocity extremums conforming to Group V2 according to standards Vibration velocity extremums conforming to Group V3 according to standards Vibration velocity extremums conforming to Group V4 according to standards	6305/ V1 6305/ V2

Note: Other codes and non-standard special bearing codes are not listed in the above table. Please consult the technical center of C&U Group if necessry.

2.7.7 Arrangement code

Arrangement codes are shown in Table 2.14.

Table 2.14 Configuration codes

Code	Meaning	Example
/DB	Matched back-to-back mounting	7210C/ DB
/DF	Matched face-to-face mounting	32205/ DF
/DT	Matched tandem mounting	7210C/ DT

2.7.8 Codes of bearings with accessories

Codes of bearings with accessories consist of bearing codes (compiled according to mentioned method) + accessory code. Specific codes are listed in Table 2.15.

Table 2.15

Accessory Name	Code of bearings with accessories[1]	Example
Adapter sleeve	Bearing code + adapter sleeve code	22205 K+H 305
Withdrawal sleeve	Bearing code + withdrawal sleeve code	22205 K+AH 305
Inner ring	Needle roller bearing without inner ring, combined needle roller bearing, bearing code+ IR	NKX 30+ IR
Separate thrust collar	Applicable to cylindrical roller bearing, Bearing code + separate thrust collar code[2]	NJ 210+ HJ 210

Note:
(1) This is only applicable to packing, drawing, design documents and manuals for bearings with accessories, and is not applicable to bearings.
(2) It can be simplified as NJ .... HJ .... = NH

3. Selection of rolling bearings

3.1 Sequence of bearing selection

Bearing varies in types, dimension ranges and are widely applied to different kinds of mechanical devices, instrument and equipment. The qualification and performance requirements for bearings are varied. How to choose the most suitable bearing type from numerous structures and dimensions is especially important.
Bearing selection should consider different kinds of factors. First, bearing arrangement, mounting, dismounting, allowable space, dimension and market conditions shall be taken as the key points of bearing's structures selection. Next, the required bearing size will be determined by comparing the calculated bearing life with the target machine life. Finally, attention shall be paid to the lubricating degradation which will impact service life, abrasion and noise. It is essential to select the right accuracy, clearance, cage, lubricating grease, etc according to the application.

Fig 3.1 shows the general sequence and rules for selecting a bearing. For special requirements, please contact C&U.

3.2 Key focus of selecting bearing types

When selecting bearing types, it is essential to completely understand the working conditions of bearings.
Table 3.1 lists some of the more common design considerations and provides some additional selection details for each.
Meanwhile the function and performance of bearings must be compared with the characteristics of various bearings. Table 3.2 lists the characteristics of main bearing types for reference.

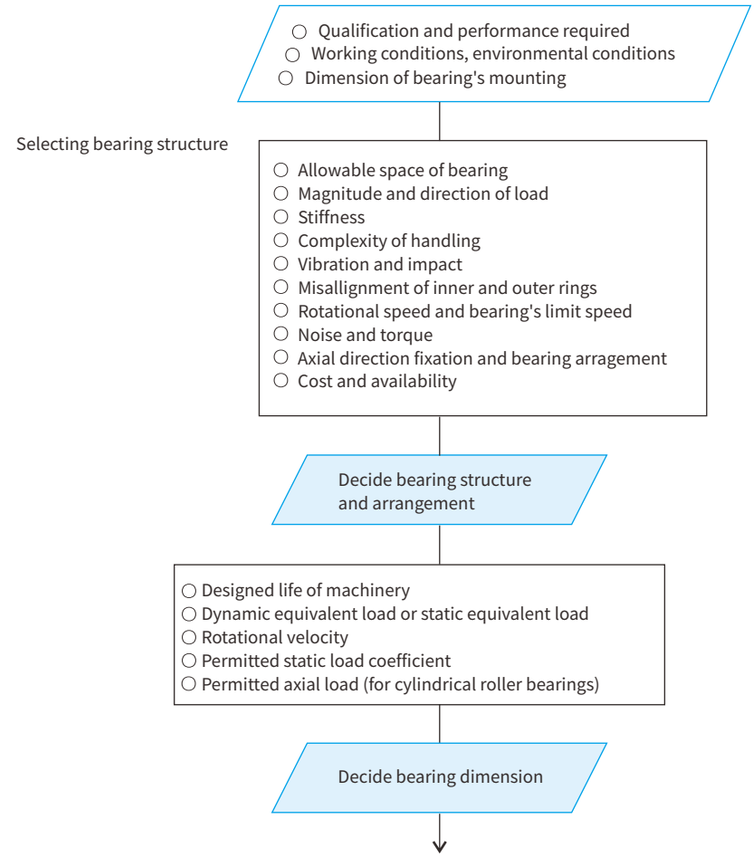


Fig. 3.1 Steps and focus of selecting rolling bearings

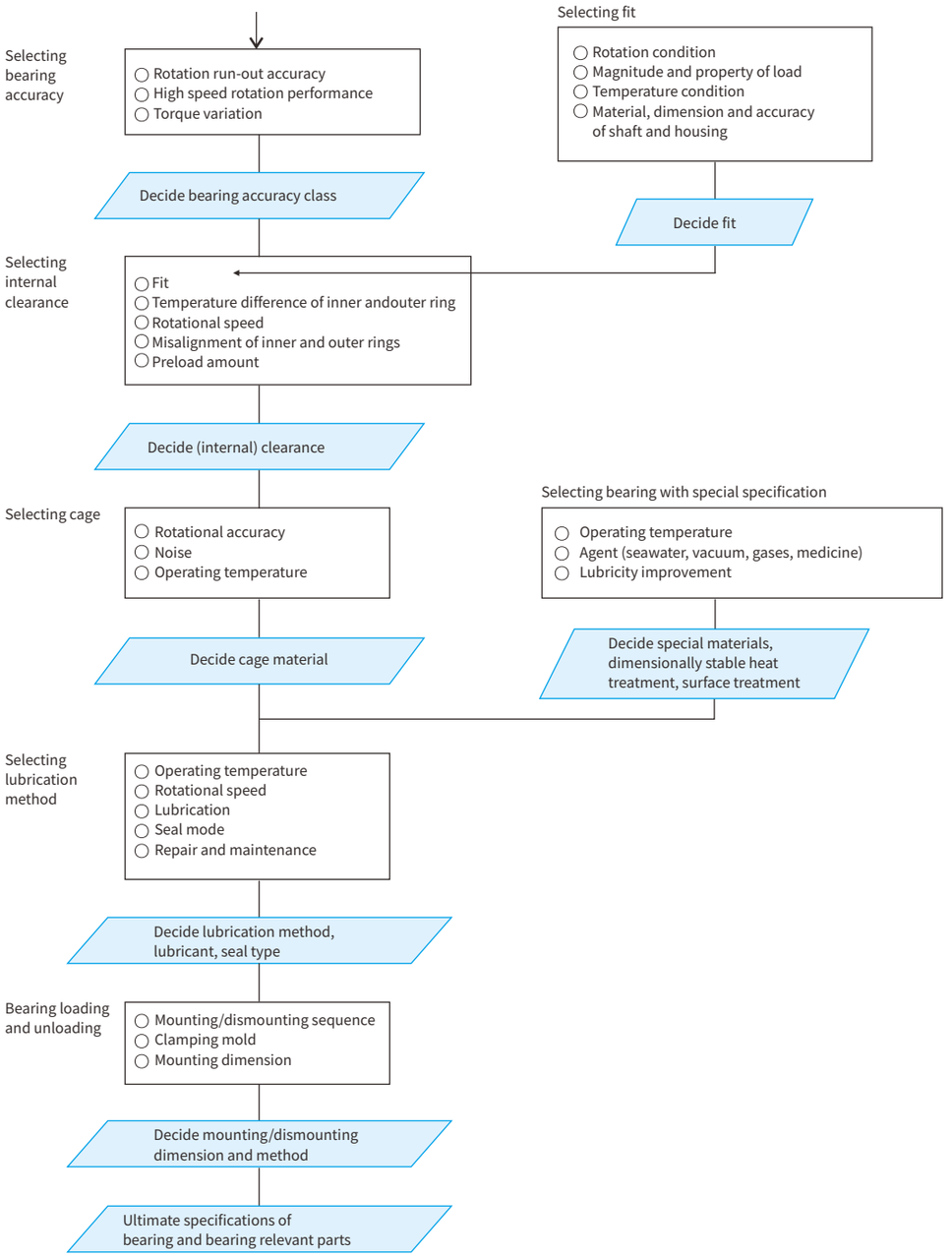


Table 3.1

Item to be considered		Selection method
1) Bearing installation space	Bearing type which can be mounted in target equipment	● Since the rigidity and intensity of shaft are carefully considered when designing shaft system, so the shaft diameter shall be determined in advance, i.e. bearing inner diameter. ● However, rolling bearings have many dimension series and types, so the optimal bearing type shall be chosen.
2) Load	Magnitude, direction and property of bearing load (Bearing's load capacity is expressed by basic load rating, and its values are shown in the bearing specification table.)	● Bearing load are changeable, such as the magnitude, the direction - axial or radial, unidirectional or bidirectional, the vibration or impact degree, etc. Only after considering these factors can the selection of the optimal bearing type be successful.
3) Rotation speed	Bearing type which can adapt to the mechanical speed (The value of rotation speed limit is expressed by limit speed, which is shown in the bearing specification table.)	● The limit rotation speed of bearings not only depends on bearing types, but also bearing dimensions, cage types, accuracy classes, load conditions and lubrication etc. ● The following bearings are mostly applied to high speed rotation: deep groove ball bearing, angular contact ball bearing and cylindrical roller bearing.
4) Running accuracy	Bearing types with required running accuracy (Dimensional accuracy and running accuracy have already been standardized.)	● Machine tool spindles, gas turbines and controlling machines require high running accuracy, high rotary speed and low friction, where bearing above Grade 5 shall be used. ● Deep groove ball bearing, angular contact ball bearing and cylindrical roller bearing are often used.
5) Stiffness	Bearing types which can meet mechanical shaft's stiffness requirements(When bearing load, the contact surface of the rolling element and raceway of the bearing may generate elastic deformation. "High stiffness" means the deformation of this kind of elastic deformation is small.)	● In applications such as machine tool spindles and automobile final reduction gear etc., the stiffness of the bearing and shaft must be enhanced. ● Roller bearing generates smaller deformation than ball bearing when carrying load. ● Stiffness can be improved by applying preload (negative clearance) to the bearing. This method is applicable to angular contact bearing and tapered roller bearing.
6) Misalignment of inner ring and outer ring	Analyze the factors which cause the misalignment tilt of bearing inner ring and outer ring (such as shaft deflection caused by loading, housing inaccuracy or mounting error), and select the bearing which can suit this working condition.	● If the misalignment of inner ring and outer ring is too large, bearing will generate internal load and cause damage. Therefore, the bearing type which can take this kind of misalignment shall be chosen. ● In general, allowable misalignment angle (or self-aligning angular) increases according to the following order: cylindrical roller bearing < tapered roller bearing < deep groove ball bearing (angular contact ball bearing) < self-aligning roller (ball) bearing.
7) Mounting and dismounting	Consider the mounting/dismounting method and frequency	● When mounting and dismounting is frequent, cylindrical roller bearing, needle roller bearing and tapered roller bearing with separable inner ring and outer ring are used. ● Tapered bore self-aligning ball bearing and tapered bore spherical bearing are easy to mount and dismount by using adapter sleeve or withdrawal sleeve.

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Table 3.2 Structures and features of rolling bearings

Bearing type performance and features		Deep groove ball bearing	Angular contact ball bearing			Four-point contact ball bearing	Self-aligning ball bearing	Cylindrical roller bearing					Needle roller bearing (solid type)	Tapered roller bearing		Spherical roller bearing	Thrust ball bearing		Thrust cylindrical roller bearing	Thrust needle roller bearing	Thrust tapered roller bearing	Thrust spherical roller bearing
			Single row	Matched	Double row			NU, N	NJ, NF	NUP, NH	NNU, NN			Single row	Double row, four-row		Flat seat washer	Aligning seat washer				
Load capacity	Radial load	○	○	◎	◎	○	○	◎	◎	◎	◎		◎	◎	◎	◎	×	×	×	×	×	△
	Axial load	○ ↔	◎ ←	◎ ↔	◎ ↔	◎ ↔	△ ↔	×	△ ←	△ ↔	×		×	◎ ←	◎ ↔	△ ↔	○ ←	○ ←	◎ ←	◎ ←	◎ ←	◎ ←
	Combined load	○	○	◎	◎	○	△	×	△	△	×		×	◎	◎	△	×	×	×	×	×	△
	Impact resistance	△	△	△	△	△	△	◎	◎	◎	◎		○	◎	◎	◎	△	△	○	○	◎	◎
High-speed rotation		◎	◎	◎	○	◎	△	◎	◎	◎	◎		○	○	○	○	△	△	△	△	△	△
High accuracy		◎	◎	◎		◎		◎			◎			○			○					
Low noise& torque		◎						○														
Stiffness				○		○		○	○	○	◎		○	○	◎				◎	◎	◎	
Misalignment		○	△	×	×	×	◎	△	△	△	△		△	△	△	◎	×	◎	×	×	×	◎
Separable IR&OR		×	×	×	×	■	×	■	■	■	■		■	■	■	×	■	■	■	■	■	■
Arrangement	Fixed end	■ ↔	■ ←	■ ↔	■ ↔	■ ↔	■ ↔	×	■ ←	■ ↔	×		×	■ ←	■ ↔	■ ↔						
	Free end	□		□	□	□	□	■	□	□	■		■		□	□						

Remarks:

◎: Excellent

○: Good

△: Fair

×: Unacceptable

→: One-direction only

←→: Both direction

□: Acceptable

■: Acceptable, use mating surface to avoid shaft shrinkage

4. Structure selection and arrangement of bearings

4.1 Structure selection

4.1.1 Bearing space and bearing structure

The space for bearing installation is limited, so the structure and dimensions of bearing must be carefully selected to maximize performance in the limited space. The design is typically determined by the shaft size (diameter) based upon application requirements. This will also determine the bore size of the bearing. Rolling bearing have many standardized dimension series and structures, from which the optimal bearing design can be chosen. The general dimension series and structures of radial bearings are shown in the following Fig. 4.1

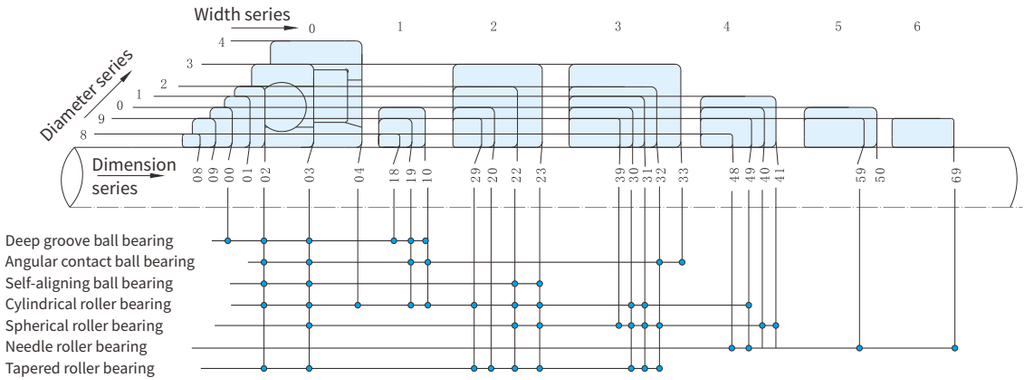


Fig. 4.1 Dimension series and bearing types of radial bearings

4.1.2 Load and bearing structure

The bearing type will determine the load carrying ability. Radial load capacity and axial load capacity are a function of the internal design of the bearing. As shown in Fig. 4.2, roller bearings have a larger load capacity than ball bearings and are a preferred choice if impact or shock loads exist.

Bearing type	Radial load capacity				Axial load capacity			
	Weak→Strong				Weak→Strong			
	1	2	3	4	1	2	3	4
Single row deep groove ball bearing	—				—			
Single row angular contact ball bearing	—	—			—	—	—	
Cylindrical roller bearing	—	—	—					
Tapered roller bearing	—	—	—		—	—	—	
Spherical roller bearing	—	—	—	—	—	—		

Fig. 4.2 Load capacity according to bearing types

4.1.3 Limiting speed and bearing type

The allowable limiting speed of rolling bearings not only depends upon bearing structure, but also the cage type and design, material used, bearing loads, lubrication method, amount of heat dissipation and other factors. With general oil bath lubrication, the limiting speeds of various bearing types are shown in Fig 4.3.

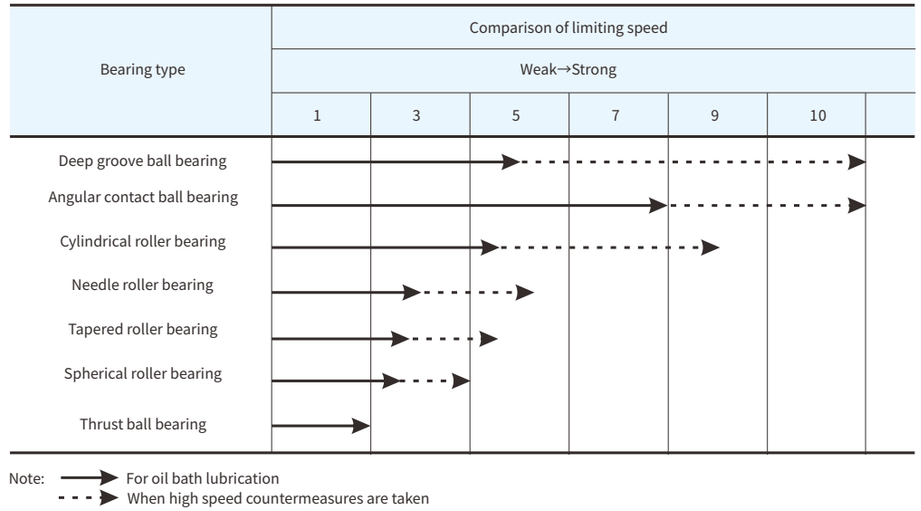


Fig. 4.3 Limiting speed according to bearing types

4.1.4 Misalignment of inner and outer rings

Normal operating conditions within an application can result in a small amount of misalignment between the inner and outer rings of a bearing. Shaft deflection, shaft or housing inaccuracy, mounting error, etc., all can contribute to this occurring. Allowable misalignment is dependent upon the bearing type and application conditions but the misalignment angle is usually small, less than 0.0012 radians (4').

If larger misalignment is anticipated, self-aligning ball bearings, spherical roller bearings or certain mounted bearing units should be chosen.

4.1.5 Rigidity and bearing structure

After a bearing is under load, the contact surface between the rolling element and raceway of the bearing may generate elastic deformation. The rigidity of the bearing is determined by the load on the bearing and the ratio of the elastic deformation among inner ring, outer ring and rolling element.

Machine tool bearings require high rigidity so roller bearings are more commonly used because they deform less under load.

When extra rigidity is needed, bearings are preloaded (negative clearance) to improve performance. This is commonly done with angular contact ball bearings and tapered roller bearings.

Cylindrical roller bearings are not permitted to operate in a negative clearance condition.

4.1.6 Noise, torque and bearing structure

Since rolling bearings are manufactured with such high precision, noise and torque are typically extremely low. Noise classes are specified for deep groove ball bearings and roller bearings based upon their application and usage. Deep groove ball bearings are recommended for applications such as motors and measurement instruments because of their low noise and low torque.

4.1.7 Running accuracy and bearing types

When high running accuracy is needed in an application, such as machine tool spindles or superchargers, higher precision classes are specified such as Class 5, Class 4 or Class 2.

Running accuracy of rolling element bearings is specified in various ways, therefore, for those applications requiring high running accuracy, deep groove ball bearings, angular contact ball bearings and cylindrical roller bearings are often used.

4.1.8 Mounting, dismounting and bearing types

Bearings that are separable like cylindrical roller bearings, needle roller bearings and tapered roller bearings are extremely convenient for mounting and dismounting. The inner and outer rings can separate which aids for mounting bearing rings on shafts or in housings. For applications that require frequent inspections, separable bearings are recommended. Tapered bore bearings and spherical roller bearings are easier to mount and dismount if adapter sleeves are used.

4.2 Arrangement

In most common applications, a shaft is supported by two bearings, one on each end of the shaft. The following factors should be considered when determining the bearing arrangement:

1) Temperature fluctuations that will result in shaft expansion and contraction;
2) Ability to mount and dismount the bearings in the application;
3) Possible misalignment of the inner and outer rings, i.e. shaft deflection or mounting error;
4) Rigidity of the bearing system due arrangement and preload
5) Bearing system ability to handle application loads

4.2.1 Fixed-end bearing and free-end bearing

Bearing arrangements typically have a fixed-end and free-end bearing. The fixed-end bearing must be capable of carrying both radial and axial loads. This is because the fixed end bearing is used to maintain axial position in the application. The free-end bearings only carry radial loads. Free-end bearings allow for shaft expansion and contraction due to temperature changes. If there is no allowance for shaft expansion and contraction in an application, a bearing can be subjected to excessive axial loading which will lead to premature failure.

A common choice for a free-end bearing is one that has separable inner and outer rings. Cylindrical roller bearings and needle roller bearings are common choices because of their ability to move freely in the axial direction. Assembly and disassembly is also easier with these types of bearings. If a non-separable bearing is used as a free-end bearing, other arrangements must be made to allow for axial shaft movement. A loose fit of the bearing housing bore or a loose fit of the bearing on the shaft will allow for the expansion and contraction of the bearing system.

If there is a short distance between bearings within an application, opposing angular contact ball bearings or tapered roller bearings may be used. The amount of axial movement (axial clearance) is adjusted by using shims or spacers.

For the convenience of axial positioning, mostly one bearing is set as fixed-end bearing and the other bearings are used as free-end bearings. Table 4.1 lists the selections of fixed end and free end bearing structures.

See Table 4.1 for examples of fixed-end and free-end arrangements.

Table 4.1 Selection of fix-end and free-end bearing arrangements

Bearing arrangement	Contents	Applied bearing type
Fixed-end bearing	● Used to maintain axial position and location ● Bearing must be capable of handling radial and axial loads ● Bearing must be capable of handling axial loads in both directions. ● Bearing selection is determined based upon axial load capacity	● Deep groove ball bearing, matched angular contact ball bearing ● Double row angular contact ball bearing, self-aligning ball bearing ● Cylindrical roller bearing with rib (NUP type, NH type) ● Double row tapered roller bearing, spherical roller bearing
Free-end bearing	● Allows for shaft expansion and contraction due to temperature changes during operation ● Often a separable bearing is chosen which only takes a radial load but allows for axial movement ● If a non-separable bearing is chosen, loose clearance is provided in either housing or shaft to allow for shaft movement	● Cylindrical roller bearing (NU type, N type) ● Inseparable type ● Deep groove ball bearing, matched angular contact ball bearing ● Double row angular contact ball bearing ● Self-aligning ball bearing ● Double row tapered roller bearing ● Spherical roller bearing
No fixed-end and free end	● If bearing distances are small and shaft growth negligible, angular contact ball bearings or tapered roller bearings can be used in an opposed arrangement ● Axial clearance can be adjusted using nuts, washers or shims	● Deep groove ball bearing ● Angular contact ball bearing ● Self-aligning ball bearing ● Cylindrical roller bearing(NJ,NF type) ● Tapered roller bearing ● Spherical roller bearing
Used for vertical shaft	● Fixed-end bearing must be able to take radial and axial loads at the same time ● If axial load is large, thrust bearing may be used with radial bearing (fixed-end) and a second radial bearing may be used (free-end) ● Bearing which can only take radial load is used at the free end to avoid shaft displacement	● Double row tapered roller bearing ● Thrust bearing and radial shaft ● Matched angular contact ball bearings (back-to-back) (fixed-end) ● Double row tapered roller bearing ● Thrust roller bearing ● Spherical roller bearing ● Cylindrical roller bearing (free-end)

4.2.2 Example of typical bearing arrangements

The examples shown in Table 4.2 are common bearing arrangement options. Items considered are preload, rigidity, shaft displacement, mounting error, load direction and magnitude.

Table 4.2 Typical bearing arrangements and examples

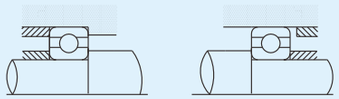
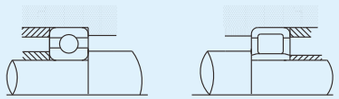
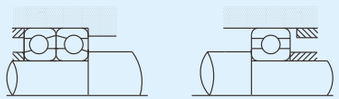
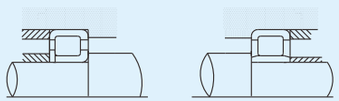
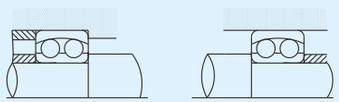
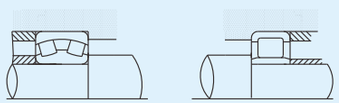
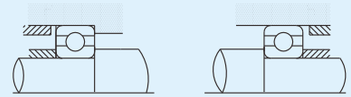
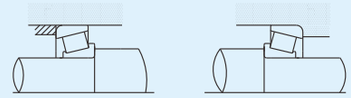
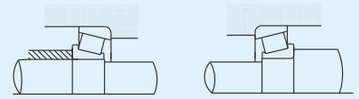
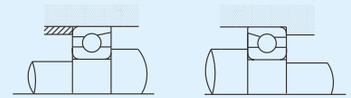
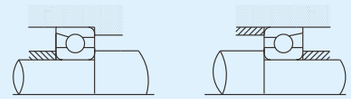
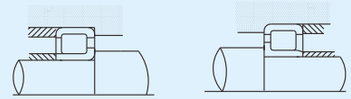
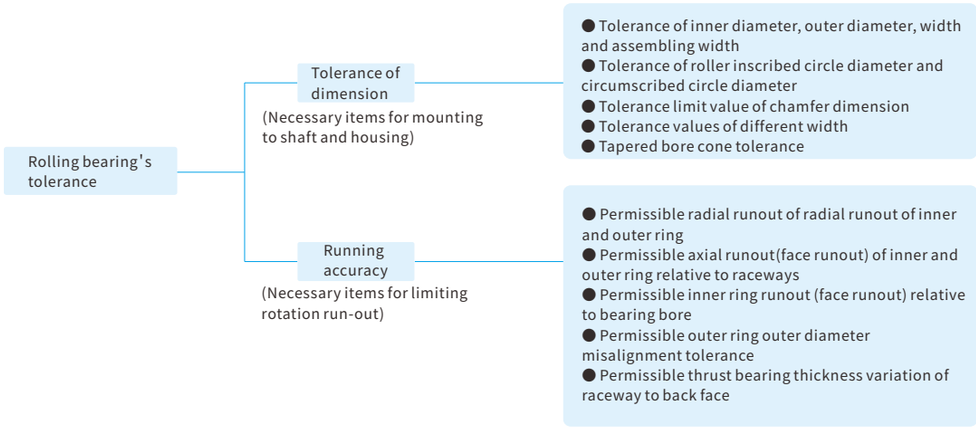
Bearing arrangement		Recommended application	Example
Fixed-end	Free-end		
		1. General arrangement common for small equipment/machinery 2. Can accept radial and certain axial loads 3. Often uses wavy washer for light preload	● Small motor ● Small pump ● Automobile transmissions
		1. Often used in high-speed application 2. Small deflection of shaft is permitted 3. Minimal mounting error required	● Medium-sized motor ● Blower etc.
		1. Design good for heavy radial loads, impact loads and moderate axial loads 2. May be used where tight fit of inner and outer rings is required 3. Bearing types are separable which facilitates assembly and disassembly	● Turbine speed reducer ● Small machine tool spindle etc.
		1. Can take heavy load, impact load, a certain degree of axial load 2. Applied where inner ring and outer ring require interference 3. Bearing separation structure facilitates mounting and dismounting	● Automotive main motor ● Automobile transmission etc.
		1. Applied where there is deflection and possible mounting error 2. Should not be used for axial positioning 3. Not applicable for axial loads 4. Not applicable when there is shaft shoulder on the shaft and applicable to mounting with adapter sleeve	● General industrial machinery ● Reducer etc.
		1. Can handle heavy radial loads and impact loads 2. Only small to moderate axial loads 3. Good choice when both inner and outer rings require interference fit	● Reducers of general industrial machinery ● Paper manufactory turning calender roller ● Diesel locomotive axle journal etc.

Table 4.2 Typical bearing arrangements and examples (continuation)

Bearing arrangement Condition without fixed-end and free-end	Recommended application	Example
	1. Wavy washer can be used on outer ring of one bearing for preload	● Small motor ● Small pump ● Small reducer etc.
 Face-to-face installation  Back-to-back installation	1. Can take heavy loads and impact loads. Multiple arrangement is used. 2. Face-to-face arrangements are good when inner ring interference is necessary. It can also be beneficial when mounting error is possible. 3. Back-to-back arrangement is an excellent choice when the distance between bearings. is small and moment loads can be applied. 4. If preload is required, attention to mounted clearance and preload amount is necessary.	● Automobile differential gear ● Pinion shaft ● Automobile front& rear wheel ● Worm speed reducer etc.
 Face-to-face installation  Back-to-back installation	1. Back-to-back arrangement is used in high speed applications where radial loads are moderate but axial loads are relatively heavy. 2. The rigidity of the shaft can be improved by applying preload. 3. Back to back arrangement is preferable when moment loads exist.	● Grinding spindle of grinder. etc.
 NJ+NJ arrangement	1. Excellent for heavy radial loads and shock loads 2. It is applied when both inner ring and outer ring require interference fit. 3. The axial clearance shall not be too large. 4. Care must be taken to ensure axial clearance remains after installation and during operation.	● Construction machinery ● Mining machine, etc.

5. Bearing accuracy

Bearing accuracy mainly refers to dimensional accuracy and running accuracy of rolling bearings. The national standards take ISO standards ISO 492/199/582 (Accuracies of Rolling Bearings) as reference, specifying different accuracy classes, tolerance classes and tolerance value of main dimensions. Bearing tolerance has 5 classes - P0, P6, P5, P4 and P2. Each tolerance class improves incrementally, lowest to highest. For most general purpose applications, P0 (or P6) are chosen as suitable precision. When applications or conditions require higher precision, accuracy class P5 or higher is chosen, as listed in Table 5.1.



See Table 5.2 for application standards and accuracy class of main bearing types

Table 5.1 Use examples of precision bearing

Performance requirement	Application	Applicable accuracy class
Bearing requires high running accuracy	Stereo set, video machine shaft (video recorder, recorder)	P5 P4
	Radar, paraboloid fulcra	P4
	Machine tool spindles	P5 P4 P2
	Electronic computer, disc	P5 P4 P2
	Aluminum foil journal	P5
	Multiple level rolling mill block bearing	P4
High speed rotation	Supercharger	P5 P4
	Jet engine	P2
	Centrifugal separator	P5 P4
	Liquefied natural gas pump	P5
	Turbine molecular pump	P5 P4
	Machine tool spindles	P5 P4 P2
	Tensioner	P5 P4
Requires low friction and low torque	Controlling machine (sync motor, servomotor, whirligig gimbal mount)	P4
	Metering device	P5
	Machine tool spindles	P5 P4 P2

Table 5.2 Accuracy class and bearing type

Bearing type			Applicable accuracy class				
Deep groove ball bearing			P0	P6	P5	P4	P2
Angular contact ball bearing			P0	P6	P5	P4	P2
Self-aligning ball bearing			P0	P6	P5	—	—
Cylindrical roller bearing			P0	P6	P5	P4	P2
Needle roller bearing			P0	P6	P5	—	—
Spherical roller bearing			P0	P6	P5	—	—
Tapered roller bearing		Metric series	P0, P6X	(P6)	P5	P4	—
		Inch series	ANSI/ABMA Class 4	ANSI/ABMA Class 2	ANSI/ABMA Class 3	ANSI/ABMA Class 0	ANSI/ABMA Class 00
Thrust ball bearing			P0	P6	P5	P4	—
Spherical thrust ball bearing			P0	—	—	—	—
Corresponding standards	ISO[1]		Normal Class	Class 6	Class 5	Class 4	Class 2
	DIN[2]		P0	P6	P5	P4	P2
	JIS[3]		Class 0 (Class 6X)	Class 6	Class 5	Class 4	Class 2
	ANSI/ABMA[4]	Ball bearing	ABEC 1	ABEC 3	ABEC 5 (Class 5P)	ABEC 7 (Class 7P)	ABEC 9 (Class 9P)
		Roller bearing	RBEC 1	RBEC 3	RBEC 5	—	—
		Tapered roller bearing	Class 4	Class 2	Class 3	Class 0	Class 00

Note: [1] International Standard
[2] Germany Standard
[3] Japanese Industrial Standards
[4] American National Standards

5.1 Tolerance class

See Table 5.3 ~ 5.7 for the dimensional accuracy and running accuracy of various bearings.

Table 5.3 Tolerance of radial bearing (excluding tapered roller bearing)

1. Inner ring

Unit: μm

Bearing nominal bore diameter d (mm)		Single plane mean bore diameter deviation[2] Δ_{dmp}					Single bore diameter deviation Δ_{ds}		Single radial plane bore diameter variation[2] V_{dsp}			Single radial plane bore diameter variation[2] V_{dsp}								Mean bore diameter variation[2] V_{dmp}				
		Class 0	Class 6	Class 5	Class 4	Class 2	Class 4	Class 2	Class 0			Class 6			Class 5		Class 4		Class 2	Class 0	Class 6	Class 5	Class 4	Class 2
							Diameter series		Diameter series			Diameter series			Diameter series		Diameter series							
							0, 1, 2, 3, 4		7, 8, 9	0, 1	2, 3, 4	7, 8, 9	0, 1	2, 3, 4	7, 8, 9	0, 1, 2, 3, 4	7, 8, 9	0, 1, 2, 3, 4							
Over	Up to	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Max			Max			Max		Max		Max	Max	Max	Max	Max	Max
0.6[1]	2.5	0 −8	0 −7	0 −5	0 −4	0 −2.5	0 −4	0 −2.5	10	8	6	9	7	5	5	4	4	3	2.5	6	5	3	2	1.5
2.5	10	0 −8	0 −7	0 −5	0 −4	0 −2.5	0 −4	0 −2.5	10	8	6	9	7	5	5	4	4	3	2.5	6	5	3	2	1.5
10	18	0 −8	0 −7	0 −5	0 −4	0 −2.5	0 −4	0 −2.5	10	8	6	9	7	5	5	4	4	3	2.5	6	5	3	2	1.5
18	30	0 −10	0 −8	0 −6	0 −5	0 −2.5	0 −5	0 −2.5	13	10	8	10	8	6	6	5	5	4	2.5	8	6	3	2.5	1.5
30	50	0 −12	0 −10	0 −8	0 −6	0 −2.5	0 −6	0 −2.5	15	12	9	13	10	8	8	6	6	5	2.5	9	8	4	3	1.5
50	80	0 −15	0 −12	0 −9	0 −7	0 −4	0 −7	0 −4	19	19	11	15	15	9	9	7	7	5	4	11	9	5	3.5	2
80	120	0 −20	0 −15	0 −10	0 −8	0 −5	0 −8	0 −5	25	25	15	19	19	11	10	8	8	6	5	15	11	5	4	2.5
120	150	0 −25	0 −18	0 −13	0 −10	0 −7	0 −10	0 −7	31	31	19	23	23	14	13	10	10	8	7	19	14	7	5	3.5
150	180	0 −25	0 −18	0 −13	0 −10	0 −7	0 −10	0 −7	31	31	19	23	23	14	13	10	10	8	7	19	14	7	5	3.5
180	250	0 −30	0 −22	0 −15	0 −12	0 −8	0 −12	0 −8	38	38	23	28	28	17	15	12	12	9	8	23	17	8	6	4
250	315	0 −35	0 −25	0 −18	—	—	—	—	44	44	26	31	31	19	18	14	—	—	—	26	19	9	—	—
315	400	0 −40	0 −30	0 −23	—	—	—	—	50	50	30	38	38	23	23	18	—	—	—	30	23	12	—	—
400	500	0 −45	0 −35	—	—	—	—	—	56	56	34	44	44	26	—	—	—	—	—	34	26	—	—	—
500	630	0 −50	0 −40	—	—	—	—	—	63	63	38	50	50	30	—	—	—	—	—	38	30	—	—	—
630	800	0 −75	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
800	1000	0 −100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1000	1250	0 −125	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1250	1600	0 −160	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1600	2000	0 −200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Note: (1) 0.6 mm is included in this dimension section.
(2) Applicable for bearings with cylindrical bores.

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1. Inner ring (continuation)

Unit: μm

Bearing nominal bore diameter d (mm)		Single inner ring width deviation (Δ_{Bs} = (Δ_{Cs})					Inner ring (or outer ring) width variation[3] V_{Bs} (V_{Cs})						Radial run-out K_{ia}					Perpendicularity of end face to bore diameter S_d			Axial run-out[3] S_{ia}			Bearing nominal bore diameter d (mm)	
		Single bearing			Matched duplex bearing		Inner ring (or outer ring)																		
		Class 0 Class 6	Class 5 Class 4	Class 2	Class 0 Class 6	Class 5 Class 4	Class 0	Class 6	Class 5	Class 4	Class 2		Class 0	Class 6	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2		
Over	Up to	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Max	Max	Max	Max	Max		Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Over	Up to
0.6[1]	2.5	0 −40	0 −40	0 −40	—	0 −250	12	12	5	2.5	1.5		10	5	4	2.5	1.5	7	3	1.5	7	3	1.5	0.6	2.5
2.5	10	0 −120	0 −40	0 −40	0 −250	0 −250	15	15	5	2.5	1.5		10	6	4	2.5	1.5	7	3	1.5	7	3	1.5	2.5	10
10	18	0 −120	0 −80	0 −80	0 −250	0 −250	20	20	5	2.5	1.5		10	7	4	2.5	1.5	7	3	1.5	7	3	1.5	10	18
18	30	0 −120	0 −120	0 −120	0 −250	0 −250	20	20	5	2.5	1.5		13	8	4	3	2.5	8	4	1.5	8	4	2.5	18	30
30	50	0 −120	0 −120	0 −120	0 −250	0 −250	20	20	5	3	1.5		15	10	5	4	2.5	8	4	1.5	8	4	2.5	30	50
50	80	0 −150	0 −150	0 −150	0 −380	0 −250	25	25	6	4	1.5		20	10	5	4	2.5	8	5	1.5	8	5	2.5	50	80
80	120	0 −200	0 −200	0 −200	0 −380	0 −380	25	25	7	4	2.5		25	13	6	5	2.5	9	5	2.5	9	5	2.5	80	120
120	150	0 −250	0 −250	0 −250	0 −500	0 −380	30	30	8	5	2.5		30	18	8	6	2.5	10	6	2.5	10	7	2.5	120	150
150	180	0 −250	0 −250	0 −250	0 −500	0 −380	30	30	8	5	4		30	18	8	6	5	10	6	4	10	7	5	150	180
180	250	0 −300	0 −300	0 −300	0 −500	0 −500	30	30	10	6	5		40	20	10	8	5	11	7	5	13	8	5	180	250
250	315	0 −350	0 −350	—	0 −500	0 −500	35	35	13	—	—		50	25	13	—	—	13	—	—	15	—	—	250	315
315	400	0 −400	0 −400	—	0 −630	0 −630	40	40	15	—	—		60	30	15	—	—	15	—	—	20	—	—	315	400
400	500	0 −450	—	—	—	—	50	45	—	—	—		65	35	—	—	—	—	—	—	—	—	—	400	500
500	630	0 −500	—	—	—	—	60	50	—	—	—		70	40	—	—	—	—	—	—	—	—	—	500	630
630	800	0 −750	—	—	—	—	70	—	—	—	—		80	—	—	—	—	—	—	—	—	—	—	630	800
800	1000	0 −1000	—	—	—	—	80	—	—	—	—		90	—	—	—	—	—	—	—	—	—	—	800	1000
1000	1250	0 −1250	—	—	—	—	100	—	—	—	—		100	—	—	—	—	—	—	—	—	—	—	1000	1250
1250	1600	0 −1600	—	—	—	—	120	—	—	—	—		120	—	—	—	—	—	—	—	—	—	—	1250	1600
1600	2000	0 −2000	—	—	—	—	140	—	—	—	—		140	—	—	—	—	—	—	—	—	—	—	1600	2000

Note: (1) 0.6 mm is included in this dimension section.
(2) Applicable to bearings with cylindrical bores.
(3) Applicable to groove ball bearings.

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Table 5.3 Tolerance of radial bearing(excluding tapered roller bearing) (continuation)

2. Outer ring

Unit: μm

Bearing nominal outside diameter D (mm)		Single plane mean outside diameter deviation Δ_{Dmp}					Single outside diameter deviation Δ_{Ds}		Single radial plane outside diameter variation (2) V_{Dsp}				Single radial plane outside diameter variation (2) V_{Dsp}									Average outside diameter variation inside the plane (2) V_{Dmp}				
		Class 0	Class 6	Class 5	Class 4	Class 2	Class 4	Class 2	Class 0				Class 6				Class 5		Class 4		Class 2	Class 0	Class 6	Class 5	Class 4	Class 2
							Diameter series		Open type			Shielded type	Open type				Open type		Open type		Open type					
							0, 1, 2, 3, 4		Diameter series				Diameter series				Diameter series		Diameter series							
									7, 8, 9	0, 1	2, 3, 4	2, 3, 4	7, 8, 9	0, 1	2, 3, 4	0, 1, 2, 3, 4	7, 8, 9	0, 1, 2, 3, 4	7, 8, 9	0, 1, 2, 3, 4						
Over	Up to	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Upper Lower	Max				Max				Max		Max		Max	Max	Max	Max	Max	Max
2.5 (1)	6	0 −8	0 −7	0 −5	0 −4	0 −2.5	0 −4	0 −2.5	10	8	6	10	9	7	5	9	5	4	4	3	2.5	6	5	3	2	1.5
6	18	0 −8	0 −7	0 −5	0 −4	0 −2.5	0 −4	0 −2.5	10	8	6	10	9	7	5	9	5	4	4	3	2.5	6	5	3	2	1.5
18	30	0 −9	0 −8	0 −6	0 −5	0 −4	0 −5	0 −4	12	9	7	12	10	8	6	10	6	5	5	4	4	7	6	3	2.5	2
30	50	0 −11	0 −9	0 −7	0 −6	0 −4	0 −6	0 −4	14	11	8	16	11	9	7	13	7	5	6	5	4	8	7	4	3	2
50	80	0 −13	0 −11	0 −9	0 −7	0 −4	0 −7	0 −4	16	13	10	20	14	11	8	16	9	7	7	5	4	10	8	5	3.5	2
80	120	0 −15	0 −13	0 −10	0 −8	0 −5	0 −8	0 −5	19	19	11	26	16	16	10	20	10	8	8	6	5	11	10	5	4	2.5
120	150	0 −18	0 −15	0 −11	0 −9	0 −5	0 −9	0 −5	23	23	14	30	19	19	11	25	11	8	9	7	5	14	11	6	5	2.5
150	180	0 −25	0 −18	0 −13	0 −10	0 −7	0 −10	0 −7	31	31	19	38	23	23	14	30	13	10	10	8	7	19	14	7	5	3.5
180	250	0 −30	0 −20	0 −15	0 −11	0 −8	0 −11	0 −8	38	38	23	—	25	25	15	—	15	11	11	8	8	23	15	8	6	4
250	315	0 −35	0 −25	0 −18	0 −13	0 −8	0 −13	0 −8	44	44	26	—	31	31	19	—	18	14	13	10	8	26	19	9	7	4
315	400	0 −40	0 −28	0 −20	0 −15	0 −10	0 −15	0 −10	50	50	30	—	35	35	21	—	20	15	15	11	10	30	21	10	8	5
400	500	0 −45	0 −33	0 −23	—	—	—	—	56	56	34	—	41	41	25	—	23	17	—	—	—	34	25	12	—	—
500	630	0 −50	0 −38	0 −28	—	—	—	—	63	63	38	—	48	48	29	—	28	21	—	—	—	38	29	14	—	—
630	800	0 −75	0 −45	0 −33	—	—	—	—	94	94	55	—	56	56	34	—	35	26	—	—	—	55	34	18	—	—
800	1000	0 −100	0 −60	—	—	—	—	—	125	125	75	—	75	75	45	—	—	—	—	—	—	75	45	—	—	—
1000	1250	0 −125	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1250	1600	0 −160	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1600	2000	0 −200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Note:
(1) 2.5 mm is included in this dimension section.
(2) Applicable to occasions before the mounting or after the dismounting of the inner/outer snap ring
(3) Applicable to ball bearings, such as deep groove ball bearing, radial-thrust ball bearing, etc.
(4) Only applicable to groove ball bearing.
(5) Not applicable for flanged outer ring bearing.

2. Outer ring (continuation)

Unit: μm

Radial run-out K_{ea}					Perpendicularity of outside surface to end face (5) S_D			Axial run-out (3) S_{ea}			Width variation (4) V_{CS}			Bearing nominal outside diameter D (mm)	
Class 0	Class 6	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2		
Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Over	Up to
15	8	5	3	1.5	8	4	1.5	8	5	1.5	5	2.5	1.5	2.5	6
15	8	5	3	1.5	8	4	1.5	8	5	1.5	5	2.5	1.5	6	18
15	9	6	4	2.5	8	4	1.5	8	5	2.5	5	2.5	1.5	18	30
20	10	7	5	2.5	8	4	1.5	8	5	2.5	5	2.5	1.5	30	50
25	13	8	5	4	8	4	1.5	10	5	4	6	3	1.5	50	80
35	18	10	6	5	9	5	2.5	11	6	5	8	4	2.5	80	120
40	20	11	7	5	10	5	2.5	13	7	5	8	5	2.5	120	150
45	23	13	8	5	10	5	2.5	14	8	5	8	5	2.5	150	180
50	25	15	10	7	11	7	4	15	10	7	10	7	4	180	250
60	30	18	11	7	13	8	5	18	10	7	11	7	5	250	315
70	35	20	13	8	13	10	7	20	13	8	13	8	7	315	400
80	40	23	—	—	15	—	—	23	—	—	15	—	—	400	500
100	50	25	—	—	18	—	—	25	—	—	18	—	—	500	630
120	60	30	—	—	20	—	—	30	—	—	20	—	—	630	800
140	75	—	—	—	—	—	—	—	—	—	—	—	—	800	1000
160	—	—	—	—	—	—	—	—	—	—	—	—	—	1000	1250
190	—	—	—	—	—	—	—	—	—	—	—	—	—	1250	1600
220	—	—	—	—	—	—	—	—	—	—	—	—	—	1600	2000

Notes: The outer ring's width deviation Δ_{Cs} are identical with the same bearing's inner diameter's width deviation Δ_{Bs} under same precision class.

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Table 5.4 Tolerance of tapered roller bearing (Metric series)

1. Cone

Unit: μm

Bearing nominal bore diameter d (mm)		Single plane mean bore diameter deviation Δ_{dmp}						Single bore diameter deviation Δ_{ds}		Single plane mean bore diameter variation V_{dsp}			Mean bore diameter variation V_{dmp}				Radial run-out K_{ia}				Perpendicularity of end face to bore diameter S_d		Axial run-out S_{ia}
		Class 0 Class 6X		Class 5		Class 4		Class 4		Class 0 Class 6x	Class 5	Class 4	Class 0 Class 6x	Class 6	Class 5	Class 4	Class 0 Class 6x	Class 6	Class 5	Class 4	Class 5	Class 4	Class 4
Over	Up to	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
10	18	0	−12	0	−7	0	−5	0	−5	12	5	4	9	5	5	4	15	7	3.5	3	7	3	3
18	30	0	−12	0	−8	0	−6	0	−6	12	6	5	9	6	5	4	18	8	4	3	8	4	4
30	50	0	−12	0	−10	0	−8	0	−8	12	8	6	9	8	5	5	20	10	5	4	8	4	4
50	80	0	−15	0	−12	0	−9	0	−9	15	9	7	11	9	6	5	25	10	5	4	8	5	4
80	120	0	−20	0	−15	0	−10	0	−10	20	11	8	15	11	8	5	30	13	6	5	9	5	5
120	180	0	−25	0	−18	0	−13	0	−13	25	14	10	19	14	9	7	35	18	8	6	10	6	7
180	250	0	−30	0	−22	0	−15	0	−15	30	17	11	23	16	11	8	50	20	10	8	11	7	8
250	315	0	−35	0	−25	0	−18	0	−18	35	19	12	26	—	—	9	60	25	13	9	13	8	9
315	400	0	−40	0	−30	0	—	0	—	40	23	—	30	—	—	—	70	30	15	12	15	10	14
400	500	0	−45	0	−35	0	—	0	—	—	28	—	—	—	—	—	80	35	18	14	17	13	—
500	630	0	−60	0	−40	—	—	—	—	—	35	—	—	—	—	—	90	40	20	—	20	—	—
630	800	0	−75	0	−50	—	—	—	—	—	45	—	—	—	—	—	100	45	22	—	25	—	—

Remarks:
1. The tolerances of bearing inner diameter specified in this table are not applicable to the range within the 1.2 times distance from ring profile chamfer dimension r (Max).
2. Tolerance and some tolerance values are subject to C&U standard.

2. Cup

Unit: μm

Bearing nominal outside diameter D (mm)		Single plane mean outside diameter deviation Δ_{Dmp}						Single outside diameter deviation Δ_{Ds}		Single plane mean outside diameter variation V_{Dsp}				Mean outside diameter variation V_{Dmp}				Radial run-out K_{ea}				Perpendicularity of end face to outside surface S_D		Axial run-out S_{ea}
		Class 0 Class 6x		Class 6 Class 5		Class 4		Class 4		Class 0 Class 6x	Class 6	Class 5	Class 4	Class 0 Class 6x	Class 6	Class 5	Class 4	Class 0 Class 6x	Class 6	Class 5	Class 4	Class 5	Class 4	Class 4
Over	Up to	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
18	30	0	−12	0	−8	0	−6	0	−6	12	8	6	5	9	6	5	4	18	9	6	4	8	4	5
30	50	0	−14	0	−9	0	−7	0	−7	14	9	7	5	11	7	5	5	20	10	7	5	8	4	5
50	80	0	−16	0	−11	0	−9	0	−9	16	11	8	7	12	8	6	5	25	13	8	5	8	4	5
80	120	0	−18	0	−13	0	−10	0	−10	18	13	10	8	14	10	7	5	35	18	10	6	9	5	6
120	150	0	−20	0	−15	0	−11	0	−11	20	15	11	8	15	11	8	6	40	20	11	7	10	5	7
150	180	0	−25	0	−18	0	−13	0	−13	25	18	14	10	19	14	9	7	45	23	13	8	10	5	8
180	250	0	−30	0	−20	0	−15	0	−15	30	20	15	11	23	15	10	8	50	25	15	10	11	7	10
250	315	0	−35	0	−25	0	−18	0	−18	35	25	19	14	26	19	13	9	60	30	18	11	13	8	10
315	400	0	−40	0	−28	0	−20	0	−20	40	28	22	15	30	21	14	10	70	35	20	13	13	10	13
400	500	0	−45	0	−33	0	−23	0	−23	45	—	—	—	34	—	—	—	80	40	24	15	17	11	15
500	630	0	−50	0	−38	0	−28	0	−28	60	—	—	—	38	—	—	—	100	50	30	18	20	13	18
630	800	0	−75	0	−45	—		—		80	—	—	—	55	—	—	—	120	60	36	—	25	—	—
800	1000	0	−100	0	−60	—		—		100	—	—	—	75	—	—	—	140	75	43	—	30	—	—

Remarks:
1. The tolerances of bearing inner diameter specified in this table are not applicable to the range within the 1.2 times distance from ring profile chamfer dimension r (Max).
2. Tolerance and some tolerance values are subject to C&U standard.

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Table 5.4 Tolerance of tapered roller bearing (Metric series) (continuation)

3. Width-cone, cup, single-row bearing and component

Unit: μm

Bearing nominal bore diameter d (mm)		Cone width deviation Δ_{Bs}						Cup width deviation Δ_{Cs}						Assembly width variation Δ_{Ts}					
		Class 0		Class 6X		Class 5 Class 4		Class 0		Class 6X		Class 5 Class 4		Class 0 Class 6		Class 6X		Class 5 Class 4	
Over	Up to	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
10	18	0	−120	0	−50	0	−200	0	−120	0	−100	0	−200	+200	0	+100	0	+200	−200
18	30	0	−120	0	−50	0	−200	0	−120	0	−100	0	−200	+200	0	+100	0	+200	−200
30	50	0	−120	0	−50	0	−240	0	−120	0	−100	0	−240	+200	0	+100	0	+200	−200
50	80	0	−150	0	−50	0	−300	0	−150	0	−100	0	−300	+200	0	+100	0	+200	−200
80	120	0	−200	0	−50	0	−400	0	−200	0	−100	0	−400	+200	−200	+100	0	+200	−200
120	180	0	−250	0	−50	0	−500	0	−250	0	−100	0	−500	+350	−250	+150	0	+350	−250
180	250	0	−300	0	−50	0	−600	0	−300	0	−100	0	−600	+350	−250	+150	0	+350	−250
250	315	0	−350	0	−50	0	−700	0	−350	0	−100	0	−700	+350	−250	+200	0	+350	−250
315	400	0	−400	0	−50	0	−800	0	−400	0	−100	0	−800	+400	−400	+200	0	+400	−400
400	500	0	−450	—		0	−900	0	−450	—		0	−900	+400	−400	—		+400	−400
500	630	0	−500	—		0	−1100	0	−500	—		0	−1100	+500	−500	—		+500	−500
630	800	0	−750	—		0	−1600	0	−750	—		0	−1600	+600	−600	—		+600	−600

Actual effective width deviation of inner subunit Δ_{T1s}				Actual effective width deviation of outer ring Δ_{T2s}				Bearing nominal bore diameter d (mm)	
Class 0		Class 6X		Class 0		Class 6X			
Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Over	Up to
+100	0	+50	0	+100	0	+50	0	10	18
+100	0	+50	0	+100	0	+50	0	180	30
+100	0	+50	0	+100	0	+50	0	30	50
+100	0	+50	0	+100	0	+50	0	50	80
+100	−100	+50	0	+100	−100	+50	0	80	120
+150	−150	+50	0	+200	−100	+100	0	120	180
+150	−150	+50	0	+200	−100	+100	0	180	250
+150	−150	+100	0	+200	−100	+100	0	250	315
+200	−200	+100	0	+200	−200	+100	0	315	400
+225	−225	+100	0	—		+100	0	400	500
—	—	—		—		—		500	630
—	—	—		—		—		630	800

Table 5.5 Tolerance of tapered roller bearing (Inch series)

1. Cone

Unit: μm

Bearing nominal bore diameter d (mm) (inch)		Single bore diameter deviation Δ_{ds}							
		Class 4		Class 3		Class 0		Class 00	
Over	Up to	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
—	76.200 (3)	+13	0	+13	0	+13	0	+8	0
76.200 (3)	266.700 (10.5)	+25	0	+13	0	+13	0	+8	0
266.700 (10.5)	304.800 (12)	+25	0	+13	0	+13	0	+8	0
304.800 (12)	609.600 (24)	+51	0	+25	0	—	—	—	—
609.600 (24)	914.400 (36)	+76	0	+38	0	—	—	—	—
914.400 (36)	1219.200(48)	+102	0	+51	0	—	—	—	—
1219.200(48)	—	+127	0	+76	0	—	—	—	—

2. Cup

Unit: μm

Bearing nominal bore diameter D (mm) (inch)		Single outside diameter deviation Δ_{Ds}							
		Class 4, 2		Class 3		Class 0		Class 00	
Over	Up to	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
—	266.700(10.5)	+25	0	+13	0	+13	0	+8	0
266.700(10.5)	304.800(12)	+25	0	+13	0	+13	0	+8	0
304.800(12)	609.600(24)	+51	0	+25	0	—	—	—	—
609.600(24)	914.400(36)	+76	0	+38	0	—	—	—	—
914.400(36)	1219.200(48)	+102	0	+51	0	—	—	—	—
1219.200(48)	—	+127	0	+76	0	—	—	—	—

Table 5.5 Tolerance of tapered roller bearing (Metric series) (continuation)

3. Radial run-out

Unit: μm

Bearing nominal outside diameter D (mm)(inch)		Radial run-out of inner ring and outer ring K_{ia}, K_{ea}				
		Class 4	Class 2	Class 3	Class 0	Class 00
Over	Up to	Max	Max	Max	Max	Max
—	266.700(10.5)	51	38	8	4	2
266.700(10.5)	304.800(12)	51	38	8	4	2
304.800(12)	609.600(24)	51	38	18		
609.600(24)	914.400(36)	76	51	51	—	—
914.400(36)	—	76	—	76	—	—

4. Assembly width

Unit: μm

Bearing nominal bore diameter d (mm) (inch)		Bearing nominal outside diameter D (mm) (inch)		Assembly width deviation Δ_{Ts}					
				Class 4		Class 3		Class 0, 00	
Over	Up to	Over	Up to	Upper	Lower	Upper	Lower	Upper	Lower
—	101.600(4)	—	—	+203	0	+203	−203	+203	−203
101.600(4)	266.700(10.5)	—	—	+356	−254	+203	−203	+203	−203
266.700(10.5)	304.800(12)	—	—	+356	−254	+203	−203	+203	−203
304.800(12)	609.600(24)	—	508.000(20)	+381	−381	+203	−203	—	—
304.800(12)	609.600(24)	508.000(20)	—	+381	−381	+381	−381	—	—
609.600(24)	—	—	—	+381	−381	+381	−381	—	—

Table 5.6 Tolerance of thrust ball bearing

(1) Shaft washer and central washer

Unit: μm

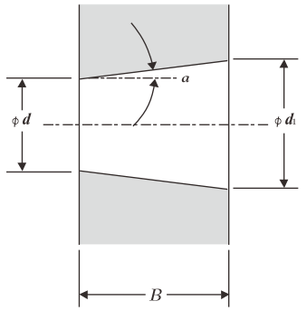
Nominal bore diameter of bearing (d) or central washer (d_z) (mm)		Single plane mean bore diameter deviation Δ_{dmp} or Δ_{d2mp}				Single plane mean bore diameter variation V_{dSp} or V_{d2Sp}		Raceway thickness variation of shaft washer or central washer S_i			
		Class 0 Class 6 Class 5		Class 4		Class 0 Class 6 Class 5	Class 4	Class 0	Class 6	Class 5	Class 4
Over	Up to	Upper	Lower	Upper	Lower	Max		Max			
—	18	0	−8	0	−7	6	5	10	5	3	2
18	30	0	−10	0	−8	8	6	10	5	3	2
30	50	0	−12	0	−10	9	8	10	6	3	2
50	80	0	−15	0	−12	11	9	10	7	4	3
80	120	0	−20	0	−15	15	11	15	8	4	3
120	180	0	−25	0	−18	19	14	15	9	5	4
180	250	0	−30	0	−22	23	17	20	10	5	4
250	315	0	−35	0	−25	26	19	25	13	7	5
315	400	0	−40	0	−30	30	23	30	15	7	5
400	500	0	−45	0	−35	34	26	30	18	9	6
500	630	0	−50	0	−40	38	30	35	21	11	7
630	800	0	−75	0	−50	—	—	40	25	13	8
800	1000	0	−100	—	—	—	—	45	30	15	—
1000	1250	0	−125	—	—	—	—	50	35	18	—

(2) Housing washer

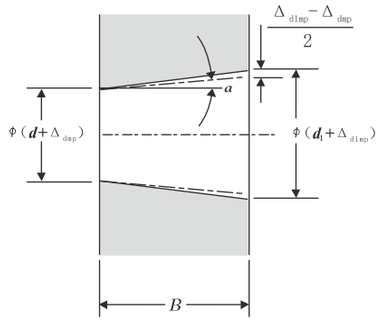
Unit: μm

Bearing nominal outside diameter D (mm)		Single plane mean outside diameter deviation Δ_{Dmp} or Δ_{D2mp}				Single plane mean outside diameter variation V_{DSp} or Δ_{D2Sp}		Raceway thickness variation of housing washer S_e			
		Class 0 Class 6 Class 5		Class 4		Class 0 Class 6 Class 5	Class 4	Class 0	Class 6	Class 5	Class 4
Over	Up to	Upper	Lower	Upper	Lower	Max		Max			
10	18	0	−11	0	−7	8	5	Conform with the S_i value of the same bearing shaft washer			
18	30	0	−13	0	−8	10	6				
30	50	0	−16	0	−9	12	7				
50	80	0	−19	0	−11	14	8				
80	120	0	−22	0	−13	17	10				
120	180	0	−25	0	−15	19	11				
180	250	0	−30	0	−20	23	15				
250	315	0	−35	0	−25	26	19				
315	400	0	−40	0	−28	30	21				
400	500	0	−45	0	−33	34	25				
500	630	0	−50	0	−38	38	29				
630	800	0	−75	0	−45	55	34				
800	1000	0	−100	0	−60	75	45				
1000	1250	0	−125	—	—	—	—				

Table 5.7 Accuracy for tapered bore of radial bearing



Theoretical tapered bore



Tapered bore with single plane mean bore diameter deviation

Table 1 Tapered bore (Taper 1:12)

Unit: μm

Bearing nominal bore diameter d (mm)		Δ_{dmp}		$\Delta_{d1mp}-\Delta_{dmp}$		V_{dsp} (1)
Over	Up to	Upper	Lower	Upper	Lower	Max
–	10	+22	0	+15	0	9
10	18	+27	0	+18	0	11
18	30	+33	0	+21	0	13
30	50	+39	0	+25	0	16
50	80	+46	0	+30	0	19
80	120	+54	0	+35	0	22
120	180	+63	0	+40	0	40
180	250	+72	0	+46	0	46
250	315	+81	0	+52	0	52
315	400	+89	0	+57	0	57
400	500	+97	0	+63	0	63

Table 2 Tapered bore (Taper 1:30)

Unit: μm

Bearing nominal bore diameter d (mm)		Δ_{dmp}		$\Delta_{d1mp}-\Delta_{dmp}$		V_{dsp} (1)
Over	Up to	Upper	Lower	Upper	Lower	Max
–	50	+15	0	+30	0	19
50	80	+15	0	+30	0	19
80	120	+20	0	+35	0	22
120	180	+25	0	+40	0	40
180	250	+30	0	+46	0	46
250	315	+35	0	+52	0	52
315	400	+40	0	+57	0	57
400	500	+45	0	+63	0	63
500	630	+50	0	+70	0	70

Note: (1) is applicable to any single radial plane with tapered bore and not applicable to diameter series 7 and 8.
Remarks:
1. d_1: Reference diameter at theoretical large end of tapered bore $d_1 = d + B/12$ or $d_1 = d + B/30$;
2. Δ_{dmp} : Single plane mean bore diameter deviation at theoretical small end of tapered bore;
3. Δ_{d1mp} : Single plane mean bore diameter deviation at theoretical large end of tapered bore;
4. V_{dsp} : Bore diameter variation in a single radial plane;
5. B: Nominal inner ring width;
6. α: ½ of nominal tapered angle of tapered bore;
α= 2° 23' 9.4" α = 0°57'17.4"
= 2.3859° = 0.95484°
= 0.041642 rad = 0.016665 rad
(tapered ratio 1/12) (tapered ration 1/30)

Table 5.8 Radial bearing chamfer limit (excluding tapered roller bearing)

Unit: mm

Minimum allowable chamfer dimension of inner and outer ring r (min) or r_1 (min) (1)	Bearing nominal bore diameter d (mm)		Maximum allowable chamfer dimension of inner and outer ring r (max) or r_1 (max)		Reference
					Corner radius of shaft and bearing housing r_a
	Over	Up to	Radial	Axial	Max
0.05	—	—	0.1	0.2	0.05
0.08	—	—	0.16	0.3	0.08
0.1	—	—	0.2	0.4	0.1
0.15	—	—	0.3	0.6	0.15
0.2	—	—	0.5	0.8	0.2
0.3	— 40	40 —	0.6 0.8	1 1	0.3
0.6	— 40	40 —	1 1.3	2 2	0.6
1	— 50	50 —	1.5 1.9	3 3	1
1.1	— 120	120 —	2 2.5	3.5 4	1
1.5	— 120	120 —	2.3 3	4 5	1.5
2	— 80 220	80 220 —	3 3.5 3.8	4.5 5 6	2
2.1	— 280	280 —	4 4.5	6.5 7	2
2.5	— 100 280	100 280 —	3.8 4.5 5	6 6 7	2
3	— 280	280 —	5 5.5	8 8	2.5
4	—	—	6.5	9	3
5	—	—	8	10	4
6	—	—	10	13	5
7.5	—	—	12.5	17	6
9.5	—	—	15	19	8
12	—	—	18	24	10
15	—	—	21	30	12
19	—	—	25	38	15

Note: (1)The minimum allowable dimension of chamfer is written in the dimension table.

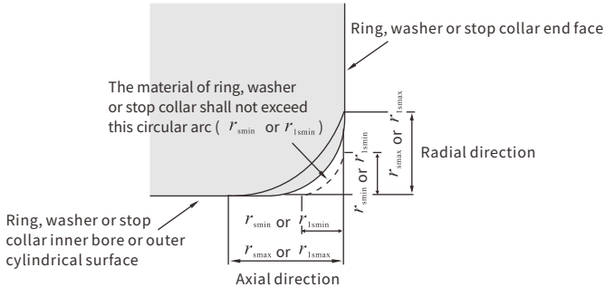


Table 5.9 Chamfer limit of tapered roller bearing (metric series)

Unit: mm

Minimum allowable chamfer dimension of inner and outer ring r (min) or r_1 (min)	Bearing nominal bore or outside diameter d/D (mm)		Maximum allowable chamfer dimension of inner and outer ring r (max) or r_1 (max)		Reference
					Shaft and housing chamfer radius r_a
	Over	Up to	Radial	Axial	Max
0.3	— 40	40 —	0.7 0.9	1.4 1.6	0.3
0.6	— 40	40 —	1.1 1.3	1.7 2	0.6
1	— 50	50 —	1.6 1.9	2.5 3	1
1.5	— 120 250	120 250 —	2.3 2.8 3.5	3 3.5 4	1.5
2	— 120 250	120 250 —	2.8 3.5 4	4 4.5 5	2
2.5	— 120 250	120 250 —	3.5 4 4.5	5 5.5 6	2
3	— 120 250 400	120 250 400 —	4 4.5 5 5.5	5.5 6.5 7 7.5	2.5
4	— 120 250 400	120 250 400 —	5 5.5 6 6.5	7 7.5 8 8.5	3
5	— 180	180 —	6.5 7.5	8 9	4
6	— 180	180 —	7.5 9	10 11	5

Note: The maximum chamfer radius of shaft and housing bore (r_{max}) shall not exceed the minimum allowable chamfer dimension (r_{min}) in single direction of ring.

Table 5.10 Chamfer limit of thrust bearing

Unit: mm

Minimum allowable chamfer dimension of inner ring (or central washer) and outer ring r (min) or r_1 (min)	Maximum allowable chamfer dimension of inner ring (or central washer) and outer ring r (max) or r_1 (max) In radial and axial direction	Chamfer radius of shaft or housing r_a (max)
0.05 0.08 0.1	0.1 0.16 0.2	0.05 0.08 0.1
0.15 0.2 0.3	0.3 0.5 0.8	0.15 0.2 0.3
0.6 1 1.1	1.5 2.2 2.7	0.6 1 1
1.5 2 2.1	3.5 4 4.5	1.5 2 2
3 4 5	5.5 6.5 8	2.5 3 4
6 7.5 9.5	10 12.5 15	5 6 8
12 15 19	18 21 25	10 12 15

Remarks:
The limit dimension specified in the table are applicable to:
- Outer cylindrical chamfer of back face and housing washer;
- Chamfer of back face and inner diameter surface;
- Chamfer of back face and two-direction shaft in the shaft washer inner diameter surface.

6. Fit and clearance of bearings

6.1 Fit

When mounting bearings, the fit between inner diameter and shaft, outer diameter and housing is very important. If the fit is too loose, relative sliding will occur to the fit surface, which is called creep deformation. Creep deformation will cause abrasion to the fitting surface, and damage the shaft or housing. Furthermore, sometimes abrasion metal particles could penetrate into the bearing, and bring about premature failure.

When the magnitude of interference is too large, outer ring outer diameter decreases or inner ring inner diameter increases, which further will cause the decrease of bearing internal clearance. In addition, the geometric accuracy of shaft and housing will also affect the bearing ring's original accuracy, and then affect the bearing's performance. The relations between shaft bore diameter tolerance and inner /outer diameter fit are as shown in Fig. 6.1.

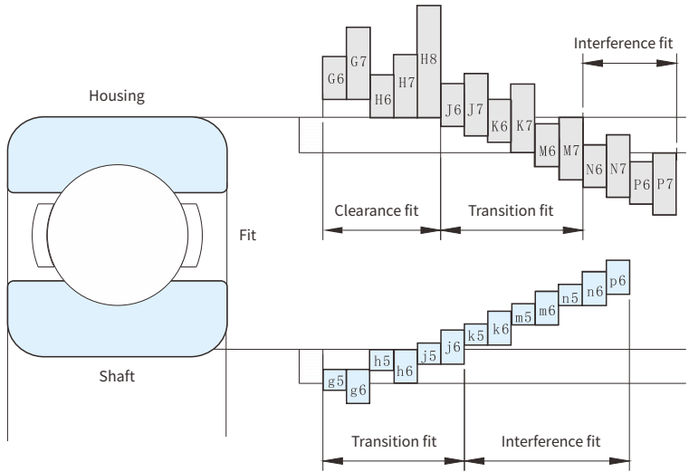


Fig. 6.1 Dimension tolerance and fit of shaft and outer bore

6.1.1 Load characteristic and fit

Based on the bearing load characteristics and the inner/outer ring rotation, it is determined whether the load carried by each ring is a rotation load, static load or indeterminate direction load. Rings carrying rotation load and indeterminate directional load shall adopt interference fit, while those carrying static load can adopt transition fit or clearance fit. See Table 6.1.

In case of large load or shock/impact load, bearing's magnitude of interference shall be increased properly. When using hollow shaft, thin-walled case or light alloy or bearing housing made of plastics, the allowance of interference shall also be properly increased.

When the working condition requires a cage with high running accuracy, then it is necessary to adopt a high precision bearing, and increase the dimension accuracy of the shaft and bearing housing, to avoid too large allowance of interference. If the allowance of interference is too large, the geometry of the shaft or bearing housing might affect the geometric shape of the bearing ring, and then affect the bearing's running accuracy.

If the inner ring and outer ring are inseparable (such as deep groove ball bearings), it would be inconvenient to adopt interference fit for both considering mounting and dismounting. In this case, it is better to adopt clearance fit to either inner ring or outer ring.

Table 6.1 Examples of selecting fit according to the characteristic of radial load

Bearing rotation condition	Direction of load	Load condition	Method
Inner ring: rotational Outer ring: static	Static load	Inner ring rotational load	Inner ring: adopt interference fit
Inner ring: static Outer ring: rotational	Rotational load	Outer ring static load	Outer ring: clearance fit available
Inner ring: static Outer ring: rotation	Static load	Inner ring static load	Inner ring: clearance fit available
Inner ring: rotational Outer ring: static	Rotational load	Outer ring rotational load	Outer ring: adopt interference fit
Occasions of variable load direction, or unbalanced load, or uncertain load direction etc.	Rotational or static	Indeterminate direction load	Interference fit

6.1.2 Calculation of interference allowance

1) Load and interference

When the bearing carries radial load, the interference of the inner ring will decrease. The decrease amount of the inner ring interference can be determined with the following two formulas:

When $F_r < 0.2C_{0r}$,

$\triangle d_F = 0.08 \sqrt{d \cdot F_r / B}$

$F_r \geqslant 0.2C_{0r}$,

$\triangle d_F = 0.02 (F_r/B)$

In the formula

$\triangle d_F$: decrease amount of the interference of the inner ring μm

d: bearing inner diameter mm

B: inner ring width mm

F_r: radial load N

C_{0r}: basic static load rating N

2) Interference allowance caused by the temperature difference of bearing, shaft and housing

The interference amount of the fitting surface of the inner ring will decrease along with the increase of the bearing temperature during operation. △T(°c) is supposed to be the difference between the bearing internal temperature and surrounding environment temperature. The temperature difference of the shaft and the fitting surface of the inner ring can be (0.1 ~ 0.15) ΔT. Therefore, $\triangle d_T$, the decrease amount of the inner ring interference caused by this temperature difference can be determined with the following formula:

$\triangle d_T = (0.1 \sim 0.15) \triangle T \cdot a \cdot d$

$= 0.0015 \triangle T \cdot d$

In the equations:

$\triangle d_T$: decrease amount of the interference due to temperature difference μm

△T: temperature difference between bearing internal and surrounding environment °C

a: linear expansion coefficient of bearing steel ($12.5X10^{-6}$ °C)

d: bearing nominal bore diameter mm

In addition, since the temperature difference and expansion coefficient is not the same between outer rings and bearing housings, the interference allowance sometimes will increase instead.

3) Effective interference allowance and target

Due to the roughness of the fitting surface, press fit effective interference allowance can be smaller than target interference allowance. The decrease of target interference allowance differs according to the working accuracy of the fitting surface.

Generally, effective interference allowance can be determined with the following formula:

Grinded shaft $\triangle d_{eff} = d/(d+2) \cdot \triangle d_a$

Machined shaft $\triangle d_{eff} = d/(d+3) \cdot \triangle d_a$

In the equations:

$\triangle d_{eff}$: effective interference allowance mm

$\triangle d_a$: target interference allowance mm

d: bearing nominal bore diameter mm

The effective interference allowance of bearings whose nominal bores are between 30mm ~ 150mm is approximately 95% of the target interference allowance.

4) Maximum interference allowance

Rings mounted on the shaft or bearing housing by using interference fit may generate tension stress or compression stress. Over interference allowance may bring about ring's fracture or shorten bearing life. Therefore, the maximum interference allowance is generally below 7/10000 of the shaft diameter or outside diameter.

6.1.3 Recommended fit

To select suitable fit, the characteristic and magnitude of the bearing load, etc., the mounting and dismounting of the bearing, and the factors temperature etc. shall be considered. When mounting the bearing to a thin wall housing or hollow shaft, the interference needs to be larger; a split housing can easily cause deformation of bearing outer ring, therefore, care should be taken when the outer ring requires interference fit. When the vibration is large, inner ring and outer ring shall adopt interference fit.

See Table 6.2 - 6.9 for general recommended fits.

In case of any particular service requirement, please contact with C&U. Please see the Section on shaft and housing for the accuracy and roughness of shaft and housing.

Table 6.2 Fit of radial bearing and shaft

Condition		Application example (reference)	Bearing nominal bore diameter d (mm)			Shaft tolerance zone	Remarks
			Ball bearing	Cylindrical roller bearing, Tapered roller bearing	Spherical roller bearing		
Outer ring rotation load	Require inner ring to be prone to move on the shaft	Wheel of stationary axle	All dimensions			g6	When there are requirements for accuracy, g5 and h5 should be used. f6 can also be used for large bearings and where convenience for inner ring movement is required.
	Don' t require inner ring to be prone to move on the shaft	Tensioner rack, rope pulley				h6	
Inner ring rotation load or indeterminate direction load	Light load: load below 0.06 C, Varying load	Household appliance, pump, blower, transition vehicles, precise machines, machine tool	≤18	—	—	js5	When there are requirements for accuracy, P5 class bearing shall be used. h5 is used for precision ball bearings whose inner diameters are below 18mm.
			18~100	≤40	—	js6 (j6)	
			100~200	40~140	—	k6	
			—	140~200	—	m6	
	Normal load: load(0.06-0.13) C,	Some large or medium-sized electric motors, turbine, pump, engine axes, cogwheel gearing, wood working machinery	≤18	—	—	js5	For single-row tapered roller bearings and single row radial-thrust ball bearings, k6 and m6 can be used to substitute for k5 and m5.
			18~100	≤40	≤40	k5	
			100~140	40~100	40~65	m5	
			140~200	100~140	65~100	m6	
			200~280	140~200	100~140	n6	
			—	200~400	140~280	p6	
			—	—	280~500	r6	
			—	—	>500	r7	
	Heavy load: 0.13 Cr load or impact load	Railway, industrial automobile, trolley main motor, construction machinery, disintegrator	—	50~140	50~100	n6	Bearing greater than normal clearance are recommended.
			—	140~200	100~140	p6	
			—	>200	140~200	r6	
			—	—	200~500	r7	
Only take axial load		Different kinds of bearing use positions	All dimensions			js6(j6)	—

Table 6.3 Fit of radial bearing and outer bore

Condition			Application example (reference)	Outer bore tolerance zone	Movement of outer ring	Remarks
One-piece housings	Outer ring rotation load	Thin-walled bearing heavy load	Automobile wheel (roller bearing) Lift traveling wheel	P7	Outer ring is incapable of movement in the axial direction	—
		Normal load, heavy load	Automobile wheel (ball bearing) Vibration screen	N7		
		Light or varying load	Transporter wheel, trochleae, tension pulley	M7		
	Indeterminate direction load	Heavy shock loads	Trolley mainframe	M7		
		Normal load or light load	Pump Crankshaft principal axes Large and medium-sized electric motors	K7	In principal, outer ring is incapable of movement in the axial direction	Outer ring does not need to move in the axial direction
One-piece or split housings		Normal load or light load		JS7(J7)	Outer ring can move in the axial direction	Require outer ring to move in the axial direction
	Inner ring rotation load	Various load	Ordinary bearing Bearing housing of railway vehicle	H7	Outer ring is easy to move in the axial direction	—
		Normal load or light load	Bearing with housing	H8		
		The temperature of shaft and inner ring is high	Paper manufacture drier	G7		
One-piece housings	Indeterminate direction load	Normal load, light load, especially demanding on accuracy rotation	Ball bearing for grinding axle and fixed bearing for high speed centrifugation compressor	JS6(J6)	Outer ring can move in the axial direction	—
			Ball bearing for grinding axle and fixed bearing for high speed centrifugation compressor	K6	Outer ring is fixed to axial direction in principal	For large load, use interference fit larger than K. If high class is specially required, it is necessary to further use small allowable difference fit according to usage respectively
	Inner ring rotation load	Varying load, especially demanding on precision rotation and large rigidity	Cylindrical roller bearings for machine tool spindles	M6 or N6	Outer ring is fixed to axial direction	
		Require noiseless running	Household electrical appliances	H6	Outer ring move in the axial direction	—

Remarks: 1. This table is applicable for cast iron or steel housings. Large interference allowance will be used for light alloy housing.
2. For special fit like pressed outer rings in roller bearing, please contact with C&U.

Table 6.4 Fit of thrust bearing and shaft

Condition		Application example	Nominal bore (mm)	Shaft tolerance zone	Remarks
Only take axial load		Lathe principal axes	All dimensions	h6 or js6 (j6)	
Resultant load, Thrust self-aligning roller bearing	Inner ring static load	Crusher	All dimensions	js6(j6)	When requiring small interference, j6, k6 and m6 can be used to substitute for k6, m6 and n6 respectively.
	Inner ring rotation load or indeterminate direction load	Fine extruding machine	<200	k6[1]	
			200~400	m6	
			>400	n6	

Table 6.5 Fit of thrust bearings and housings

Condition		Applicable bearing	Housing tolerance zone	Remarks
Only support axial load		Thrust ball bearing	Space above 0.25 mm	Normal situation
			H8	Where precision is required
		Thrust self-aligning bearing	Space in the radial direction of the outer ring	Bearing support radial load conditions
Combined load	Outer ring static load	Thrust spherical roller bearing	H7 or JS7 (J7)	
	Outer ring rotation load or indeterminate direction load		K7	Normal working conditions
			M7	With large radial load

Table 6.6 Fit of Inch series tapered roller bearing and shaft

(1) Bearing with accuracy classes Class 4 and Class 2

Unit: μm

Condition		Bearing nominal bore d (mm)		Bearing inner diameter deviation $\triangle_{ds}$		Shaft dimensional tolerance		Remarks
		Over	Up to	Upper	Lower	Upper	Lower	
Inner ring rotation load	Normal load	—	76.200	+13	0	+38	+25	Normally when d≤152.4mm, the bearing clearance shall be larger than usual.
		76.200	304.800	+25	0	+64	+38	
		304.800	609.600	+51	0	+127	+76	
		609.600	914.400	+76	0	+190	+114	
	Heavy load Impact load High speed load	—	76.200	+13	0	+64	+38	Generally applicable to bearings whose operation clearance is greater than ordinary clearance. As average interference, the value 0.0005 d is adopted.
		76.200	304.800	+25	0	*	—	
		304.800	609.600	+51	0	*	—	
		609.600	914.400	+76	0	+381	+305	
Outer ring rotation load	Without impact Normal load	—	76.200	+13	0	+13	0	In principle inner ring is fixed to axial direction.
		76.200	304.800	+25	0	+25	0	
		304.800	609.600	+51	0	+51	0	
		609.600	914.400	+76	0	+76	0	
	Without impact Normal load	—	76.200	+13	0	0	−13	Inner ring can move in axial direction.
		76.200	304.800	+25	0	0	−25	
		304.800	609.600	+51	0	0	−51	
		609.600	914.400	+76	0	0	−76	

(2) Bearing with accuracy classes Class 3 and Class 0 (1)

Unit: μm

Condition		Bearing nominal bore diameter d (mm)		Bearing inner diameter deviation $\triangle_{ds}$		Shaft dimensional tolerance		Remarks
		Over	Up to	Upper	Lower	Upper	Lower	
Inner ring rotation load	Precision machine tool spindles	—	76.200	+13	0	+30	+18	——
		76.200	304.800	+13	0	+30	+18	
		304.800	609.600	+25	0	+64	+38	
		609.600	914.400	+38	0	+102	+64	
	Heavy load Impact load High speed rotation	—	76.200	+13	0	—	—	As average interference, the value around 0.0005 d is adopted.
		76.200	304.800	+13	0	—	—	
		304.800	609.600	+25	0	—	—	
		609.600	914.400	+38	0	—	—	
Outer ring rotation load	Precision machine tool spindles	—	76.200	+13	0	+30	+18	——
		76.200	304.800	+13	0	+30	+18	
		304.800	609.600	+25	0	+64	+38	
		609.600	914.400	+38	0	+102	+64	

Note: (1) There is no class 0 for bearings whose bore diameter exceed 304.800mm.

Table 6.7 Fit of inch system series tapered roller bearing and housing

(1) Bearing with accuracy classes Class 4 and Class 2

Unit: μm

Condition		Bearing nominal outer diameter D (mm)		Bearing outer diameter deviation $\triangle_{Ds}$		Housing dimensional tolerance		Remarks
		Over	Up to	Upper	Lower	Upper	Lower	
Inner ring rotation load	Used for free end or fixed end	—	76.200	+25	0	+76	+51	Outer ring is easy to move in axial direction
		76.200	127.000	+25	0	+76	+51	
		127.000	304.800	+25	0	+76	+51	
		304.800	609.600	+51	0	+152	+102	
		609.600	914.400	+76	0	+229	+152	
	Outer ring position can be adjusted in axial direction	—	76.200	+25	0	+25	0	Outer ring can move in axial direction
		76.200	127.000	+25	0	+25	0	
		127.000	304.800	+25	0	+51	0	
		304.800	609.600	+51	0	+76	+25	
		609.600	914.400	+76	0	+127	+51	
	Outer ring position can not be adjusted in axial direction	—	76.200	+25	0	−13	−38	In principle outer ring is fixed to axial direction
		76.200	127.000	+25	0	−25	−51	
		127.000	304.800	+25	0	−25	−51	
		304.800	609.600	+51	0	−25	−76	
		609.600	914.400	+76	0	−25	−102	
Outer ring rotation load	Normal load or outer ring position can not be adjusted in axial direction	—	76.200	+25	0	−13	−38	Outer ring is fixed to axial direction
		76.200	127.000	+25	0	−25	−51	
		127.000	304.800	+25	0	−25	−51	
		304.800	609.600	+51	0	−25	−76	
		609.600	914.400	+76	0	−25	−102	

(2) Bearing with accuracy classes, Class 3 and Class 0 (1)

Unit: μm

Condition		Bearing nominal outer diameter D (mm)		Bearing outer diameter deviation $\triangle_{Ds}$		Housing dimensional tolerance		Remarks
		Over	Up to	Upper	Lower	Upper	Lower	
Inner ring rotation load	Used for free end	—	76. 200	+13	0	+38	+25	Outer ring is easy to move in axial direction
		76. 200	304. 800	+13	0	+38	+25	
		304. 800	609. 600	+25	0	+64	+38	
		609. 600	914. 400	+38	0	+89	+51	
	Used for fixed end	—	76. 200	+13	0	+25	+13	Outer ring can move in axial direction
		76. 200	304. 800	+13	0	+25	+13	
		304. 800	609. 600	+25	0	+51	+25	
		609. 600	914. 400	+38	0	+76	+38	
	Outer ring position can be adjusted in axial direction	—	76. 200	+13	0	+13	0	In principle outer ring is fixed to axial direction
		76. 200	304. 800	+13	0	+13	0	
		304. 800	609. 600	+25	0	+25	0	
		609. 600	914. 400	+38	0	+38	0	
	Outer ring position can not be adjusted in axial direction	—	76. 200	+13	0	0	−13	Outer ring is fixed to axial direction
		76. 200	304. 800	+13	0	0	−13	
		304. 800	609. 600	+25	0	0	−25	
		609. 600	914. 400	+38	0	0	−38	
Outer ring rotation load	Normal load or outer ring position can not be adjusted in axial direction	—	76. 200	+13	0	−13	−25	Outer ring is fixed to axial direction
		76. 200	152. 400	+13	0	−13	−25	
		152. 400	304. 800	+13	0	−13	−38	
		304. 800	609. 600	+25	0	−13	−38	
		609. 600	914. 400	+38	0	−13	−51	

Note: (1) There is no class 0 for bearings whose outer diameter exceed 304.800mm.

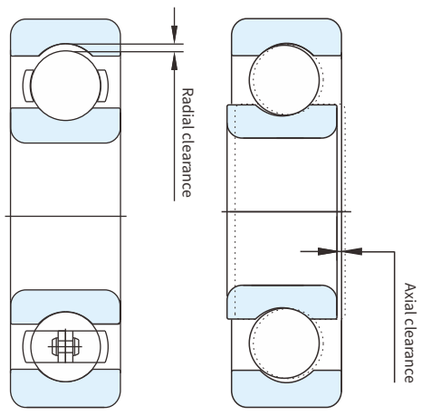


Fig. 6.2 Bearing clearance

6.2 Clearance

Clearance (i.e. internal clearance) is a very important operation characteristic of bearings. Clearance's magnitude has an quite effect on the fatigue life, vibration, noise, temperature rise and mechanical movement accuracy of the bearings. When selecting a bearing, both the structure dimension and the clearance of the bearings need to be determined.

Bearing clearance refers to the space between the inner/outer ring and the rolling element, i.e. the distance of movement up-and-down (radial direction) or left-and-right (axial direction) when the inner or outer ring is fixed. The radial distance of movement is called radial clearance, and axial distance of movement is called axial clearance. See Fig. 6.2.

6.2.1 Mutual relations of bearing clearance

According to the different states of bearings, clearance falls into original clearance, fit clearance and operating clearance. Bearing clearance (bearing's original clearance) is the clearance value before installation and the clearance value without load, also called bearing's theoretical clearance or geometry clearance ($\triangle_0$), and it is the clearance when the bearing is assembled in the manufactory.

After the inner ring is installed on the shaft or the outer ring is installed on the bearing housing, the radial dimension of the bearing ring is changed. Generally, the inner ring expands due to interference fit and the outer ring shrinks, which reduces the internal clearance. The clearance after bearing installation is called fit clearance ($\triangle_f$). Fit clearance is less than original clearance, and its decrease is about 70 % ~ 90 % of the interference depending on the bearing structure, dimension, and the shaft and housing design.

Bearing operating clearance includes effective clearance. Under no-load running, bearing clearance will decrease due to temperature rise of bearing ring and temperature difference between the inner and outer ring. The decreased clearance is called effective clearance ($\triangle_u$). This is the clearance when the bearing runs without load.

When the bearing runs under working load, elastic deformation will occur with contact of the rolling element and raceway, resulting in bearing clearance increase, which is called operating clearance ($\triangle$).

The mutual relations of the original clearance $\triangle_0$, fit clearance $\triangle_f$, effective clearance $\triangle_u$ and operating clearance $\triangle$ of deep groove ball bearing are shown in Fig. 6.3.

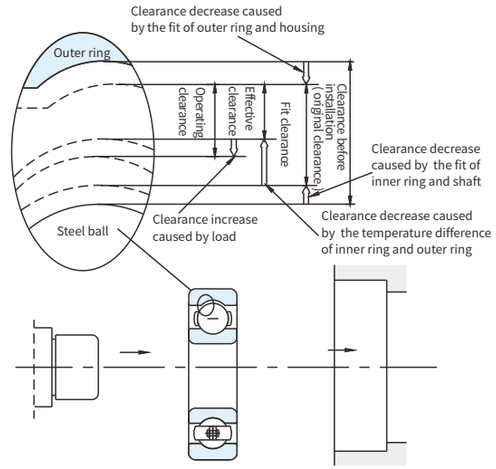


Fig. 6.3 Sketch of single row deep groove ball bearing clearance

Using the theoretical clearance (original clearance $\triangle_0$) to subtract the clearance decrement caused by fit, i.e. Δ_{fi} (clearance decrease caused by the fit of inner ring and shaft) and δ_{fo} (clearance decrease caused by the fit of outer ring and housing), and the result is the assembling clearance after installation.

$$\triangle_f=\triangle_0-(\delta_{fi}+\delta_{fo})$$

Since heat dissipation is typically greater for the housing than the shaft, the outer ring temperature is generally 5~10℃ lower than that of inner ring and rolling element. When grease lubrication is used or the shaft is intermediate hollow through heat medium, heat from the shaft will be passed to the bearing; under high rotation speed, the temperature difference between inner ring and outer ring is even larger. Because of the temperature of inner and outer rings, radial clearance will decrease due to the difference of thermal expansion. The estimated decrease can be determined with the following formula:

$$\delta_t=\alpha\times\triangle_t\times D_e$$

In the equations:

δ_t: Clearance decrease caused by the temperature difference (mm)

α: Linear expansion coefficient of bearing steel 12.5×10^{-6}/℃

$\triangle_t$: Temperature difference of inner and outer rings ℃

D_e: Raceway diameter of outer ring (mm)

For ball bearing:

$$D_e=0.20\times(d+4.0D)$$

For roller bearing:

$$D_e=0.25\times(d+3.0D)$$

In the equation:

d: Bearing inner diameter (mm)

D: Bearing outer diameter (mm)

Bearing's effective clearance $\triangle_u$ is equal to the fit clearance $\triangle_f$ minus the clearance reduction δ_t caused by the temperature difference between the inner and outer rings, ie. $\triangle_u=\triangle_f-\delta_t$.

$\triangle_u$ is the major portion of operating clearance. When the bearing works under different operating loads, elastic deformation will occur to the contact surface of the rolling element and the ring, resulting in bearing internal clearance increase, i.e. δ_w operating clearance is:

$$\triangle=\triangle_u+\delta_w$$
$$=\triangle_0-\delta_{fi}-\delta_{fo}-\delta_t+\delta_w$$

In the equations:

$\triangle$: Operating clearance, mm

$\triangle_0$: Original clearance, mm

δ_{fi}: Clearance decrease caused by the fit of inner ring and shaft, mm

δ_{fo}: Clearance decrease caused by the fit of outer ring and housing, mm

δ_t: Clearance decrease caused by the temperature difference of inner and outer ring, mm

6.2.2 Bearing's original clearance and operating clearance

National standards specify the clearance groups of various bearings and the clearance values of each group. Group 0 is applicable to ordinary working conditions, and is also preferred; Group 2＜Group 0＜Group 3＜Group 4＜Group 5.

When measuring the (original) clearance of the bearing, in order to get stable measurements, specified test load shall be applied to the bearing ring, and then measure the clearance value of the bearing. This value is called clearance value with load. It is larger than no load clearance value, i.e. original clearance (also called theoretical clearance or geometry clearance), because the given bearing test load will cause elastic deformation to the bearing internal. See Table 6.8 for the radial clearance measurement increase of deep groove ball bearing. Generally, the measured clearance value need to be revised and the clearance increase caused by elastic deformation need to be subtracted, and therefore the theoretical original clearance $\triangle_0$ is obtained. Original clearance shall conform to standard specifications.

Compared with ball bearings, the standard clearance ranges of cylindrical roller bearings and needle roller bearings are wider, and the elastic deformation caused by measured load is small, therefore it can be ignored.

When choosing bearings, first of all suitable operating clearance should be selected according to the working conditions of the machine, and then estimate the original clearance of the chosen bearing based on operating clearance. When the bearing is working, the test value is larger than the actual clearance value, which means there is an elastic deformation caused by the additional test load. Internal clearance is a significant factor in determining the working performance and bearing life.

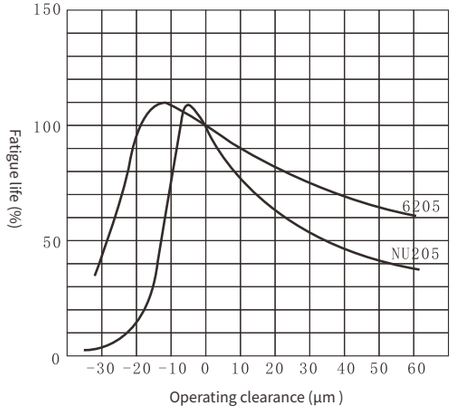


Fig. 6.4 Relation of operating clearance and fatigue life

6.2.3 Selection criteria of bearing clearance

Theoretically, when a bearing runs in a smooth state with a little negative operating clearance, the bearing life is longest, but it is very difficult to keep this kind of optimum condition. Once the working conditions fluctuate, the negative clearance will increase and bearing temperature will rise, which greatly decreases the bearing life. Sometimes the elongation of shaft caused by temperature rise may generate large added axial load. Relation of operating clearance and fatigue life is shown in Fig.6.4. Therefore, when selecting original clearance, it is recommended that operating clearance is little larger than 0. Single row angular contact ball bearings and tapered roller bearings are also required to keep a certain operating clearance except for preload. The former is negative clearance, and the latter is positive clearance. For working expansion of shaft, proper axial clearance is required to avoid generating large axial load caused by the elongation of the shaft, which might shorten the bearing life.

When selecting original clearance for bearings with different structure, the basic clearance values in the clearance group of each bearing shall be preferred. It is applicable for ordinary working conditions, where inner ring uses interference installation, takes load below normal ($P \approx 0.1C_r$) and inner ring rotation speed is below 50% of limit speed. If installation and operation conditions are different from ordinary working conditions, special clearance groups which are less or greater than base group shall be chosen. For example, when inner/outer ring adopts interference fit and working temperature is abnormal, larger or smaller clearance groups shall be used. See Table 6.9 for the non-ordinary clearance examples.

The selection of non-base group clearance (0) shouldn't be too large or too small. For bearings with too large original clearance, too large operating clearance will cause the reduction of load area, running accuracy and bearing life, and the increase of rolling contact stress, vibration and noise. Only when the machine requires large interference fit, large temperature difference of inner and outer ring, or low friction torque will bearings with clearance value of C3, C4 or C5 will be chosen. However, too small clearance will also cause the increase of heating and temperature rise, and even result in the seizure of bearing during running. Therefore, clearance which is smaller than C0 can only be used when high shaft running accuracy and close restraint for the axial displacement are required. In general, the operating clearance determines the selection of original clearance.

Table 6.8 Correction of deep groove ball bearings under measured load

Bearing nominal inner diameter (mm)		Measured load (N)	Clearance correction (μm)				
Over	Up to		Group 2	Standard (Group 0)	Group 3	Group 4	Group 5
2.5	18	24.5	3~4	4	4	4	4
18	50	49	4~5	5	6	6	6
50	280	147	6~8	8	9	9	9

Remarks:
In the correction of C2 clearance, small numbers are applicable to minimum clearance, and large numbers are applicable to maximum clearance.
When d > 280 mm, please contact R&D center of C&U Group.

Table 6.9 Examples of non-ordinary clearance

Working condition	Working condition	Adopted clearance
Take heavy load, impact load, large interference	Axle for railway vehicles	C3
	Vibration screen	C3, C4
Take indeterminate direction load, inner and outer rings both adopt interference fit	Traction motors for railway vehicles	C4
	Tractor, end reducer	C4
Bearing or inner ring heated	Paper machine, dryer	C3, C4
	Press roller	C3
Reduce rotation vibration and noise	Micromotors	C2

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6.2.4 Standards and recommended values of bearing clearance

See Table 6.10~6.17 for clearance standards of bearings.

Table 6.10 Radial clearance of deep groove ball bearing (cylindrical bore)

Bearing nominal diameter d (mm)		Clearance (μm)									
		C2		C0		C3		C4		C5	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.5	6	0	7	2	13	8	23	–	–	–	–
6	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	230
200	225	2	35	25	85	75	140	125	195	175	265
225	250	2	40	30	95	85	160	145	225	205	300
250	280	2	45	35	105	90	170	155	245	225	340
280	315	2	55	40	115	100	190	175	270	245	370
315	355	3	60	45	125	110	210	195	300	275	410
355	400	3	70	55	145	130	240	225	340	315	460
400	450	3	80	60	170	150	270	250	380	350	510
450	500	3	90	70	190	170	300	280	420	390	570
500	560	10	100	80	210	190	330	310	470	440	630
560	630	10	110	90	230	210	360	340	520	490	690
630	710	20	130	110	260	240	400	380	570	540	760
710	800	20	140	120	290	270	450	430	630	600	840
800	900	20	160	140	320	300	500	480	700	670	940
900	1000	20	170	150	350	330	550	530	770	740	1040
1000	1120	20	180	160	380	360	600	580	850	820	1150
1120	1250	20	190	170	410	390	650	630	920	890	1260

Table 6.11 Radial clearance of self-aligning ball bearing (cylindrical bore)

Bearing nominal diameter d (mm)		Clearance (μm)									
		C2		C0		C3		C4		C5	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.5	6	1	8	5	15	10	20	15	25	21	33
6	10	2	9	6	17	12	25	19	33	27	42
10	14	2	10	6	19	13	26	21	35	30	48
14	18	3	12	8	21	15	28	23	37	32	50
18	24	4	14	10	23	17	30	25	39	34	52
24	30	5	16	11	24	19	35	29	46	40	58
30	40	6	18	13	29	23	40	34	53	46	66
40	50	6	19	14	31	25	44	37	57	50	71
50	65	7	21	16	36	30	50	45	69	62	88
65	80	8	24	18	40	35	60	54	83	76	108
80	100	9	27	22	48	42	70	64	96	89	124
100	120	10	31	25	56	50	83	75	114	105	145
120	140	10	38	30	68	60	100	90	135	125	175
140	160	15	44	35	80	70	120	110	161	150	210

Table 6.12 Radial clearance of self-aligning ball bearing (tapered bore)

Bearing nominal diameter d (mm)		Clearance (μm)									
		C2		C0		C3		C4		C5	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
18	24	7	17	13	26	20	33	28	42	37	55
24	30	9	20	15	28	23	39	33	50	44	62
30	40	12	24	19	35	29	46	40	59	52	72
40	50	14	27	22	39	33	52	45	65	58	79
50	65	18	32	27	47	41	61	56	80	73	99
65	80	23	39	35	57	50	75	69	98	91	123
80	100	29	47	42	68	62	90	84	116	109	144
100	120	35	56	50	81	75	108	100	139	130	170
120	140	40	68	60	98	90	130	120	165	155	205
140	160	45	74	65	110	100	150	140	191	180	240

Table 6.13 Radial clearance of cylindrical roller bearing

Bearing nominal diameter d (mm)		Clearance (μm)									
		C2		C0		C3		C4		C5	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
–	10	0	25	20	45	35	60	50	75	–	–
10	24	0	25	20	45	35	60	50	75	65	90
24	30	0	25	20	45	35	60	50	75	70	95
30	40	5	30	25	50	45	70	60	85	80	105
40	50	5	35	30	60	50	80	70	100	95	125
50	65	10	40	40	70	60	90	80	110	110	140
65	80	10	45	40	75	65	100	90	125	130	165
80	100	15	50	50	85	75	110	105	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735

6.2.5 Radial clearance of needle roller bearings

Except for pressed outer ring and heavy series, needle roller bearings with inner ring, outer ring and cage adopts the radial clearance value of cylindrical roller bearing in Table 6.13.

For radial clearance of heavy needle roller bearings with inner and outer rings and needle roller bearing with cage whose inner ring is delivered as a separate part, the radial clearance is determined by raceway diameter of the inner ring and inner diameter of roller.

Radial clearance of deep groove ball bearing for motors

Bearing nominal diameter d (mm)		Clearance (μm)	
		CM	
Over	Up to	Min	Max
10(incl.)	18	4	11
18	30	5	12
30	50	9	17
50	80	12	22
80	120	18	30
120	160	24	38

Table 6.14 Radial clearance of spherical roller bearing (cylindrical bore)

Bearing nominal diameter d (mm)		Clearance (μm)									
		C2		C0		C3		C4		C5	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
14	18	10	20	20	35	35	45	45	60	60	75
18	24	10	20	20	35	35	45	45	60	60	75
24	30	15	25	25	40	40	55	55	75	75	95
30	40	15	30	30	45	45	60	60	80	80	100
40	50	20	35	35	55	55	75	75	100	100	125
50	65	20	40	40	65	65	90	90	120	120	150
65	80	30	50	50	80	80	110	110	145	145	180
80	100	35	60	60	100	100	135	135	180	180	225
100	120	40	75	75	120	120	160	160	210	210	260
120	140	50	95	95	145	145	190	190	240	240	300
140	160	60	110	110	170	170	220	220	280	280	350
160	180	65	120	120	180	180	240	240	310	310	390
180	200	70	130	130	200	200	260	260	340	340	430
200	225	80	140	140	220	220	290	290	380	380	470
225	250	90	150	150	240	240	320	320	420	420	520
250	280	100	170	170	260	260	350	350	460	460	570
280	315	110	190	190	280	280	370	370	500	500	630
315	355	120	200	200	310	310	410	410	550	550	690
355	400	130	220	220	340	340	450	450	600	600	750
400	450	140	240	240	370	370	500	500	660	660	820
450	500	140	260	260	410	410	550	550	720	720	900
500	560	150	280	280	440	440	600	600	780	780	1000
560	630	170	310	310	480	480	650	650	850	850	1100
630	710	190	350	350	530	530	700	700	920	920	1190
710	800	210	390	390	580	580	770	770	1010	1010	1300
800	900	230	430	430	650	650	860	860	1120	1120	1440
900	1000	260	480	480	710	710	930	930	1220	1220	1570

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Table 6.15 Radial clearance of spherical roller bearing (tapered bore)

Bearing nominal diameter d (mm)		Cylindrical bore (μm)									
		C2		C0		C3		C4		C5	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
18	24	15	25	25	35	35	45	45	65	65	75
24	30	20	30	30	40	40	55	55	75	75	95
30	40	25	35	35	50	50	65	65	85	85	105
40	50	30	45	45	60	60	80	80	100	100	130
50	65	40	55	55	75	75	95	95	120	120	160
65	80	50	70	70	95	95	120	120	150	150	200
80	100	55	80	80	110	110	140	140	180	180	230
100	120	65	100	100	135	135	170	170	220	220	280
120	140	80	120	120	160	160	200	200	260	260	330
140	160	90	130	130	180	180	230	230	300	300	380
160	180	100	140	140	200	200	260	260	340	340	430
180	200	110	160	160	220	220	290	290	370	370	470
200	225	120	180	180	250	250	320	320	410	410	520
225	250	140	200	200	270	270	350	350	450	450	570
250	280	150	220	220	300	300	390	390	490	490	620
280	315	170	240	240	330	330	430	430	540	540	680
315	355	190	270	270	360	360	470	470	590	590	740
355	400	210	300	300	400	400	520	520	650	650	820
400	450	230	330	330	440	440	570	570	720	720	910
450	500	260	370	370	490	490	630	630	790	790	1000
500	560	290	410	410	540	540	680	680	870	870	1100
560	630	320	460	460	600	600	760	760	980	980	1230
630	710	350	510	510	670	670	850	850	1090	1090	1360
710	800	390	570	570	750	750	960	960	1220	1220	1500
800	900	440	640	640	840	840	1070	1070	1370	1370	1690
900	1000	490	710	710	930	930	1190	1190	1520	1520	1860

Table 6.16 Radial clearance of four-row cylindrical roller bearing (cylindrical bore)

Bearing nominal diameter d (mm)		Cylindrical bore (μm)									
		C2		C0		C3		C4		C5	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
80	100	15	50	50	85	75	110	105	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735
500	560	120	240	240	360	360	480	480	600	–	–
560	630	140	260	260	380	380	500	500	620	–	–
630	740	145	285	285	425	425	565	565	705	–	–
740	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	–	–

Table 6.17 Recommended radial clearance for double row cylindrical roller bearing

Bearing nominal diameter d (mm)		Tapered bore (μm)				Cylindrical bore (μm)					
		C1		C2		C1		C2		C3	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
—	24	10	20	20	30	5	15	10	20	20	30
24	30	15	25	25	35	5	15	10	25	25	35
30	40	15	25	25	40	5	15	12	25	25	40
40	50	17	30	30	45	5	18	15	30	30	45
50	65	20	35	35	50	5	20	15	35	35	50
65	80	25	40	40	60	10	25	20	40	40	60
80	100	35	55	45	70	10	30	25	45	45	70
100	120	40	60	50	80	10	30	25	50	50	80
120	140	45	70	60	90	10	35	30	60	60	90
140	160	50	75	65	100	10	35	35	65	65	100
160	180	55	85	75	110	10	40	35	75	75	110
180	200	60	90	80	120	15	45	40	80	80	120
200	225	60	95	90	135	15	50	45	90	90	135
225	250	65	100	100	150	15	50	50	100	100	150
250	280	75	110	110	165	20	55	55	110	110	165
280	315	80	120	120	180	20	60	60	120	120	180
315	355	90	135	135	200	20	65	65	135	135	200
355	400	100	150	150	225	25	75	75	150	150	225
400	450	110	170	170	255	25	85	85	170	170	255
450	500	120	190	190	285	25	95	95	190	190	285

7. Preload and lubrication of bearings

7.1 Preload

There shall be appropriate clearance for bearings in some running situations. According to different applications, some bearings are preloaded to get a negative clearance, which is called preload. When angular contact ball bearings and tapered roller bearings are used in pairs, suitable internal clearance must be adjusted through preload. According to the direction of the preload, it can be divided into axial preload and radial preload. Ball bearings often adopts axial preload and cylindrical roller bearing adopt radial preload.

7.1.1 Purpose of preload

The main purposes and examples of preload are shown in Table 7.1.

Table 7.1

Purpose of preload	Example
To improve the radial and axial positional precision of the shaft, restrain shaft runout and increase running accuracy	Bearing for machine spindle bearing and measuring instrument
To improve the rigidity of bearing	Bearing for machine spindle bearing and automobile differential gear
To reduce vibration and prevent bearing noise caused by resonance	Bearing for pony motor
To restrain the slipping of rolling element and reduce friction	High speed rotating angular contact ball bearing and thrust ball bearing
To maintain the correct position of ring and rolling element	When thrust ball bearing and thrust self-aligning bearing are used on horizontal shaft.

7.1.2 Axial preload

In most applications, the radial rigidity and angular rigidity of radial bearings can be improved through axial preload. Axial preload can also influence the rule of rigidity change.

For angular contact ball bearings, when the radial load is zero, the relation between axial load F_a and axial deformation δ_a can be calculated with the following empirical formula:

$$\delta_a = \frac{0.002}{sin\alpha}\sqrt[3]{\frac{Q^2}{D_w}} = K_a \times F_a^{\frac{2}{3}}$$

In the equation:

$$Q = \frac{F_a}{Z sin\alpha}$$

K_a: The elastic deformation coefficient of bearing. Since the actual contact angle of angular contact ball bearing depends on the axial load, so K_a isn't a constant.

D_w: Rolling element diameter

Z: Number of rolling elements

The load-deformation curve can be made with the above formula. See Figure 7.1. When a single bearing has not been preloaded, the axial deformation is δ_{a1} under the axial load F_a. If preload of bearings is F_{a0}, the axial deformation of bearing is δ_{a2} under the same additional axial load F_a. Apparently, $\delta_{a2} < \delta_{a1}$. Therefore, the axial rigidity of single row angular contact ball bearing can be improved through preload.

For tapered roller bearings, when the radial load is zero, the relation of axial load F_a and axial deformation δ_a is:

$$\delta_a = \frac{0.0006\,Q^{0.9}}{sin\alpha L_{we}^{0.8}} = K_a \times F_a^{0.9}$$

In the equation:

L_{we}: Effective length of tapered roller

For two angular contact ball bearings or tapered roller bearings of the same part number mounted in pairs, according to the preload methods, preload can be divided into position preload and constant pressure preload.

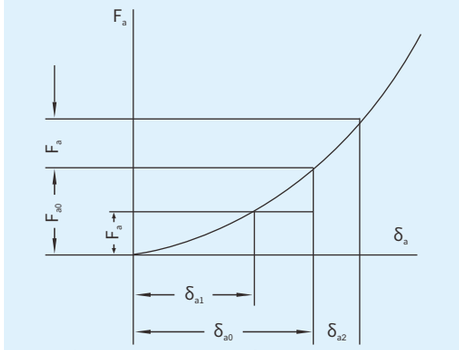


Fig. 7.1 Load and deformation curve of angular contact ball bearings

7.1.3 Position preload

Position preload refers to an axial preload where the axial position of the bearing remains constant during operation. See Fig.7.2. A certain preload can be obtained by adjusting the width of the spacers between two bearings.

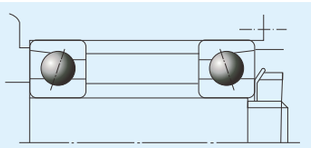


Fig.7.2 Sketch of position preload

When two angular contact bearings of the same part number are mounted in pairs, their axial load and deformation curves are shown in Fig.7.3. In the figure the intersecting point of the two bearings describes that under the preload F_{a0},the amount of preload deformation of the two bearings are both δ_{a0}. When additional axial load F_a is applied to the shaft, the shaft will move in the direction of F_a for δ_a. Then the deformation of Bearing 1 increases by δ_a, and the deformation of bearing 2 decreases by δ_a.

Seen from the figure, the axial deformation amount of the bearing 1 and bearing 2 are respectively:

$$\delta_{a1}=\delta_{a0}+\delta_a$$
$$\delta_{a2}=\delta_{a0}-\delta_a$$

Correspondingly, the axial loads carried by bearing 1 and 2 are:

$$F_{a1}=F_{a0}+\triangle F_{a1}$$
$$F_{a2}=F_{a0}-\triangle F_{a2}$$

The following can be obtained through the force condition of equilibrium:

$$F_a=F_{a1}-F_{a2}$$

It is observed that under the axial load F_a, the axial displacement of the supporting system is δ_a. Therefore, the rigidity of the supporting system of the angular contact ball bearings mounted in pairs can be significantly improved by preload.

If F_a is increased and $\triangle F_{a1}=F_{a0}$, the amount of movement of the shaft in the F_a direction $\delta_a=\delta_{a0}$. Here, bearing 2 carries no load, then:

$$\delta_{a1}=2\delta_{a0}$$
$$\delta_{a2}=0$$

The additional axial load where bearing 2 carries no load is called preload. When the preloaded bearings are a pair of angular contact ball bearing of the same part number, the preload is:

$$F_{ax}=2\sin\frac{\alpha}{2}F_{a0}=2.83F_{a0}$$

When the additional axial load F_a is greater than the above value, the axial load is completely carried by bearing 1. Here, the angular contact ball bearings mounted in pairs are equal to one single bearings. This situation shall be avoided.

When two tapered roller bearings of the same part number are mounted in pairs, their axial load and deformation curves are as shown in Fig.7.4. Seen from the figure, the rigidity of the tapered roller bearing mounted in pairs can be doubled by preload:

$$F_{ax}=2F_{a0}$$

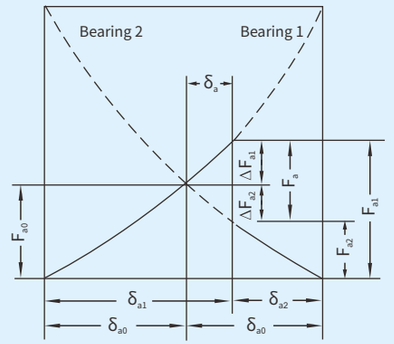


Fig.7.3 Load and deformation curve of angular contact ball bearing during position preload

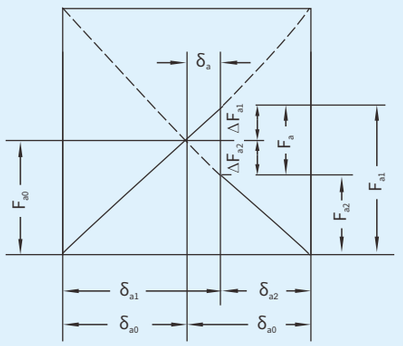


Fig.7.4 Load and deformation curve of tapered roller bearing during position preload

7.1.4 Constant pressure preload

Constant pressure preload refers to an axial preload where the axial preload of the bearing remain constant during operation. See Fig.7.5. A certain preload amount can be obtained by adjusting the amount of compression of the spring.

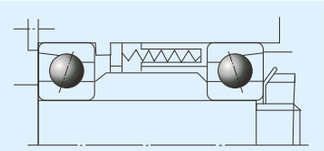


Figure 7.5 Sketch of constant pressure preload

When two angular contact ball bearings of the same part number are mounted in pairs and adopt constant pressure preload, their axial load and deformation curves are shown in Fig. 7.6. Seen from the figure, under the preload F_{a0}, the amount of preload deformation of bearing 1 and bearing 2 are both δ_{a0}. When the additional axial load F_a is applied to the shaft, the shaft moves δ_a in the F_a direction. Bearing 2's outer ring under the effect of the spring is always compressing the inner ring. Since the rigidity of the spring is relatively smaller than that of the bearing, it can be approximately considered that under the effect of the additional axial load, the amount of deformation of bearing 1 increases by δ_a whereas the amount of deformation and preload of bearing 2 remain constant.

On condition that preload forces are identical, the axial displacement of bearing is relatively small when adopting constant pressure preload, and it is easier to attain high rigidity. Constant pressure preload can absorb the change of load with spring and shrink of axle due to temperature difference between axle and housing in operation, and thus a steady preload force is obtainable. Position preload can bring large preload force.

Seen from above, position preload is more suitable if high rigidity is desired, while when high rotation speed and prevention of axial vibration is needed or in case of thrust bearing used for horizontal axle, constant pressure preload shall be preferred.

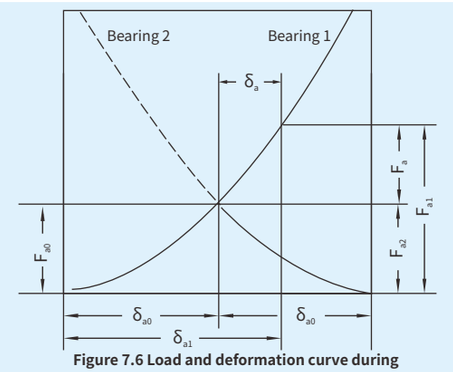


Figure 7.6 Load and deformation curve during constant pressure preload

7.1.5 The choice of minimum axial preload

The magnitude of preload should be determined according to load and operation requirements. Generally, in high speed load conditions or in purpose of diminishing the vibration of supporting system and promoting running accuracy, preload that is relatively light shall be adopted; whereas in condition of medium speed moderate loading or low speed heavy load, or in purpose of increasing the rigidity of supporting system, medium and heavy preload shall be adopted. However, too large a preload may not significantly improve the rigidity of bearings; instead the friction of bearing is enlarged, the temperature increases and its service life decreases. Generally, the magnitude of preload should be determined through calculation in conjunction with service experience. When using position preload, the rolling element shall always keep contact with raceway groove. Therefore, the minimum axial preload can be determined according to the formulas shown in Table 7.2.

In practice it is difficult to measure precisely the value of preload applied. The amount of preload can be controlled by measuring the following indexes of bearing, such as start-up friction torque, distance of axial displacement, deformation of preloaded spring, and tightening torque of nuts etc. In exceptional cases, please contact with C&U.

Table 7.2 Minimum preload of position preload

Bearing type	Load condition	Minimum preload F_{a0min}
Angular contact ball bearing	Purely axial load	$F_{a0min}\geqslant 0.35F_a$
	Combination of radial and axial loading	$\begin{cases}F_{a0min}\geqslant 1.7F_{r1}\tan\alpha_1-0.5F_a\\F_{a0min}\geqslant 1.7F_{r2}\tan\alpha_2+0.5F_a\end{cases}$ Select the bigger value
Tapered roller bearing	Purely axial load	$F_{a0min}\geqslant 0.5F_a$
	Combination of radial and axial loading	$\begin{cases}F_{a0min}\geqslant 1.9F_{r1}\tan\alpha_1-0.5F_a\\F_{a0min}\geqslant 1.9F_{r2}\tan\alpha_2+0.5F_a\end{cases}$ Select the bigger value
Code meanings	F_{r1}: Radial loading taken by bearing 1 F_{r2}: Radial loading taken by bearing 2 α_1: Contact angle of bearing 1 α_2: Contact angle of bearing 2	

Table 7.3 Preload of paired angular contact ball bearing

Unit:N

Bearing series / Preload value / d (mm)	71900C			7000C			7200C			71900AC			7000AC			7200AC			7200B, 7300B		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
10	10	20	40	15	30	60	20	40	80	15	30	60	25	50	100	35	70	140	80	330	660
12	10	20	40	15	30	60	20	40	80	15	30	60	25	50	100	35	70	140	80	330	660
15	15	30	60	20	40	80	30	60	120	25	50	100	30	60	120	45	90	180	80	330	660
17	15	30	60	25	50	100	35	70	140	25	50	100	40	80	160	60	120	240	80	330	660
20	25	50	100	35	70	140	45	90	180	35	70	140	50	100	200	70	140	280	120	480	970
25	25	50	100	35	70	140	50	100	200	40	80	160	60	120	240	80	160	320	120	480	970
30	25	50	100	50	100	200	90	180	360	40	80	160	90	180	360	150	300	600	120	480	970
35	35	70	140	60	120	240	120	240	480	60	120	240	90	180	360	190	380	760	160	630	1280
40	45	90	180	60	120	240	150	300	600	70	140	280	100	200	400	240	480	960	160	630	1280
45	50	100	200	110	220	440	160	320	640	80	160	320	170	340	680	260	520	1040	160	630	1280
50	50	100	200	110	220	440	170	340	680	80	160	320	180	360	720	260	520	1040	160	630	1280
55	70	140	280	150	300	600	210	420	840	120	240	480	230	460	920	330	660	1320	380	1500	3050
60	70	140	280	150	300	600	250	500	1000	120	240	480	240	480	960	400	800	1600	380	1500	3050
65	80	160	320	160	320	640	290	580	1160	120	240	480	240	480	960	450	900	1800	380	1500	3050
70	130	260	520	200	400	800	300	600	1200	200	400	800	300	600	1200	480	960	1920	380	1500	3050
75	130	260	520	200	400	800	310	620	1240	210	420	840	310	620	1240	500	1000	2000	380	1500	3050
80	140	280	560	240	480	960	370	740	1480	220	440	880	390	780	1560	580	1160	2320	380	1500	3050
85	170	340	680	250	500	1000	370	740	1480	270	540	1080	400	800	1600	600	1200	2400	410	1600	3250
90	180	360	720	300	600	1200	480	960	1920	280	560	1120	460	920	1840	750	1500	3000	410	1600	3250
95	190	380	760	310	620	1240	520	1040	2080	290	580	1160	480	960	1920	850	1700	3400	410	1600	3250
100	230	460	920	310	620	1240	590	1180	2360	360	720	1440	500	1000	2000	950	1900	3800	410	1600	3250
105	230	460	920	360	720	1440	650	1300	2600	360	720	1440	560	1120	2240	1000	2000	4000	410	1600	3250
110	230	460	920	420	840	1680	670	1340	2680	370	740	1480	650	1300	2600	1050	2100	4200	410	1600	3250
120	290	580	1160	430	860	1720	750	1500	3000	450	900	1800	690	1380	2760	1200	2400	4800	410	1600	3250
130	350	700	1400	560	1120	2240	800	1600	3200	540	1080	2160	900	1800	3600	1250	2500	5000	540	2150	4300
140	360	720	1440	570	1140	2280	-	-	-	560	1120	2240	900	1800	3600	-	-	-	540	2150	4300
150	470	940	1880	650	1300	2600	-	-	-	740	1480	2960	1000	2000	4000	-	-	-	540	2150	4300
160	490	980	1960	730	1460	2920	-	-	-	800	1600	3200	1150	2300	4600	-	-	-	540	2150	4300
170	500	1000	2000	800	1600	3200	-	-	-	800	1600	3200	1250	2500	5000	-	-	-	540	2150	4300
180	630	1260	2520	900	1800	3600	-	-	-	1000	2000	4000	1450	2900	5800	-	-	-	540	2150	4300
190	640	1280	2560	950	1900	3800	-	-	-	1000	2000	4000	1450	2900	5800	-	-	-	940	3700	7500
200	800	1600	3200	1100	2200	4400	-	-	-	1250	2500	5000	1750	3500	7000	-	-	-	940	3700	7500
220	850	1700	3400	1250	2500	5000	-	-	-	1300	2600	5200	2000	4000	8000	-	-	-	940	3700	7500
240	-	-	-	1300	2600	5200	-	-	-	-	-	-	2050	4100	8200	-	-	-	940	3700	7500

Note:
Series 7000C: Light, medium and heavy preload should be 0.009, 0.018 and 0.036 of bearing dynamic load rating respectively
Series 7200C: Light, medium and heavy preload should be 0.010, 0.020 and 0.040 of bearing dynamic load rating respectively
Series 7000AC: Light, medium and heavy preload should be 0.015, 0.030 and 0.060 of bearing dynamic load rating respectively
Series 7200AC: Light, medium and heavy preload should be 0.016, 0.032 and 0.064 of bearing dynamic load rating respectively

7.1.6 Radial preload

The purpose of radial preload is to increase the contact frequency of rolling elements in the loading area and improve load-taken rigidity. For high-speed cylindrical roller bearings, radial preload could decrease sliding between roller and raceway groove under the force of centrifugal action.

For bearings with tapered inner bore, locknuts are used to adjust the relative position between the inner ring and adapter, which reduces the radial clearance of bearing and realizes radial preload.

7.1.7 Preload of paired angular contact ball bearing

In the mounting of face-to face or back-to-back paired angular contact ball bearings, the amount of axial deformation caused by preload during assembly have been considered.

The protruding amount between the non-reference face of one single bearing and the reference face of another bearing are δ when certain amount of preload deformation on the end surface of the inner or outer rings of two matched bearing are left. When matched bearings are mounted to the shaft and housing, both bearings will come into preloading state by tightening the corresponding end face as shown in Figure 7.7. The sum of any universal matching bearings' δ_1 and δ_2 is 0.

The requirement for the preload and protruding amount of such type of bearing is shown in Table 7.3, Table 7.4 and Table 7.5.

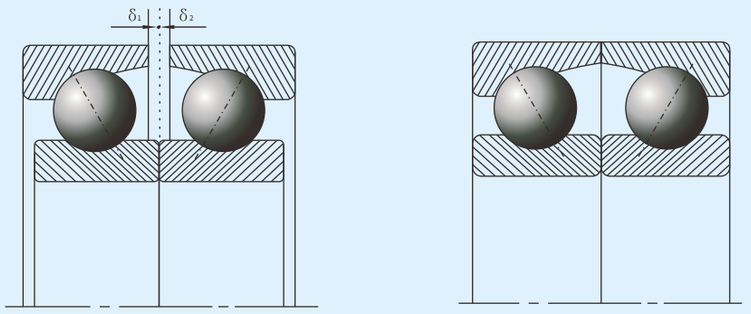


Figure 7.7 Preload mounting of paired angular contact ball bearing

a) Face-to-face arrangement b) Back-to-back arrangement

Table 7.4 Axial pre-clearance of 7200B and 7300B series matched bearings (DB or DF type)

Unit: μm

d (mm)		CA		CB		CC	
Over	Up to	Min	Max	Min	Max	Min	Max
—	10	4	12	14	22	22	30
10	18	5	13	15	23	24	32
18	30	7	15	18	26	32	40
30	50	9	17	22	30	40	48
50	80	11	23	26	38	48	60
80	120	14	26	32	44	55	67
120	180	17	29	35	47	62	74
180	250	21	37	45	61	74	90

Table 7.5 Protruding amount of paired angular contact ball bearing $\delta_1 + \delta_2$

Unit: μm

d (mm)		Bearing tolerance class							
		6		5		4		2	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max
10[a]	18	−1.5	+1.5	−1	+1	−1	+1	−1	+1
18	30	−1.5	+1.5	−1	+1	−1	+1	−1	+1
30	50	−2	+2	−1.5	+1.5	−1	+1	−1	+1
50	80	−2	+2	−1.5	+1.5	−1.5	+1.5	−1.5	+1.5
80	120	−3	+3	−2	+2	−1.5	+1.5	−1.5	+1.5
120	150	−3	+3	−2	+2	−1.5	+1.5	−1.5	+1.5
150	180	−4	+4	−3	+3	−2	+2	−2	+2
180	250	−4	+4	−3	+3	−2	+2	−2	+2

[a] Include 10 mm

7.2 Friction and lubrication

● Friction

Friction is the main cause for heating of rolling bearings and a key factor in determining the operating temperature of bearings.

The amount of friction depends on the load and several other factors, the most important of which are the bearing type, size, speed, lubricant characteristics, dosages, and sealing, etc.

The total resistance when the bearing rotates is composed of rolling and sliding friction between the components, including contact between the rolling element and the cage, the contact between the guide surface and the rolling element or the cage, friction within the lubricant and sliding friction of contact seals.

● Estimation of friction torque

Under certain conditions

Bearing load $P \approx 0.1C_r$

Well lubricated

General working conditions

The friction torque can be calculated accurately by using the following formula and the fixed friction coefficient μ.

$$M = 0.5\,\mu\,Pd$$

In the formula:

M: Friction torque, Nmm

μ : Bearing friction coefficient, see Table 1

P : Equivalent dynamic load, N

d : Bearing bore diameter, mm

Table 1 Friction coefficient μ

Bearing without sealing Bearing type	Friction coefficient μ
Deep groove ball bearing	0.0015
Angular Contact Ball bearing	
-Single row	0.0020
-Double row	0.0024
-Four-point contact	0.0024
Self-aligning ball bearing	0.0010
Cylindrical roller bearing	
-With cage bearing, if F_a=0	0.0011
- Full roller bearing, if F_a=0	0.0020
Tapered roller bearing	0.0018
Spherical roller bearing	0.0018
CARB bearing	0.0016
Thrust ball bearing	0.0013
Thrust cylindrical roller bearing	0.0050
Thrust spherical roller bearing	0.0018

● Accurate calculation of friction torque

The method for accurately calculating the friction torque of rolling bearing is to divide it into independent parts, including torque M_0 that is not affected by the load and torque M_1 that depends on the load, and then add the two torques

$$M = M_0 + M_1$$

To be more prepared to calculate friction torque of rolling bearings, four different causes of friction must be considered

$$M = M_{rr} + M_{sl} + M_{seal} + M_{drag}$$

In the formula:

M: Total friction torque, Nmm

M_{rr} :Rolling friction torque, Nmm

M_{sl} : Sliding friction torque, Nmm

M_{seal}: Seal friction torque, Nmm

M_{drag} : Friction torque caused by drag loss, eddy current and spatter, Nmm

● Rolling friction torque

The rolling friction torque is calculated according to the following formula.

$$M_{rr} = G_{rr}(vn)^{0.6}$$

In the formula:

M_{rr} : Rolling friction torque, Nmm

G_{rr} : Variables calculated according to the following conditions

d_m: Bearing average diameter, d_m=0.5(d+D) mm

F_r: Radial load, N

F_a: Axial load, N

n: speed, r/min

V: Kinematic viscosity of lubricant at operating temperature, mm^2/s (in the case of grease, it is viscosity of base oil)

The value of G_{rr} can be calculated according to the formula given in Table 2, the geometric constant R is shown in Table 3.

Regardless of the direction of F_r and F_a, only positive value is taken.

● Sliding friction torque

The sliding friction torque is calculated according to the following formula:

$$M_{s1} = G_{s1} \cdot \mu_{s1}$$

In the formula:

M_{s1} : Sliding friction torque, Nmm

G_{s1} :Variables calculated according to the following conditions

d_m: Bearing average diameter, d_m=0.5(d+D) mm

F_r: Radial load, N

F_a: Axial load, N

μ_{s1}: sliding coefficient of friction

When the lubrication is good, that is k≥2, following values can be referred to:

0.05, lubricated with mineral oil

0.04, lubricated with synthetic oil

0.1, lubricated with transmission fluid

For cylindrical roller bearings or tapered roller bearings, the following values should be used:

0.02, cylindrical roller bearing

0.002, tapered roller bearing

The value of G_{s1} can be calculated according to the formula given in Table 2, the geometric constant S is shown in Table 3.

Table 2 Variables related to geometric dimension and load used to calculate rolling and friction torque of radial bearings

Bearing type	Variables of sliding friction G_{rr}	Variables of sliding friction
Deep groove ball bearing	$If\ F_a = 0$ $G_{rr} = R_1 d_m^{1.96} F_r^{0.54}$ $If\ F_a > 0$ $G_{rr} = R_1 d_m^{1.96}\left(F_r + \frac{R_2}{\sin\partial_F} F_a\right)^{0.54}$ $\partial_F = 24.6\,(F_a/C_0)^{0.24}$ [°]	$If\ F_a = 0$ $G_{sl} = S_1 d_m^{-0.26} F_r^{5/3}$ $If\ F_a > 0$ $G_{sl} = R_1 d_m^{-0.145}\left(F_r^5 + \frac{S_2\, dm^{1.5}}{\sin\partial_F} F_a^4\right)^{1/3}$
Angular contact ball bearing	$G_{rr} = R_1 d_m^{1.97}(F_r + F_g + R_2 F_a)^{0.54}$ $F_g = R_3 d_m^4 n^2$	$G_{sl} = S_1 d_m^{0.26}\left[(F_r + F_g)^{4/3} + S_2 F_a^{4/3}\right]$ $F_g = S_3 d_m^4 n^2$
Four-point contact ball bearing	$G_{rr} = R_1 d_m^{1.97}(F_r + F_g + R_2 F_a)^{0.54}$ $F_g = R_3 d_m^4 n^2$	$G_{sl} = S_1 d_m^{0.26}\left[(F_r + F_g)^{4/3} + S_2 F_a^{4/3}\right]$ $F_g = S_3 d_m^4 n^2$
Self-aligning ball bearing	$G_{rr} = R_1 d_m^2(F_r + F_g + R_2 F_a)^{0.54}$ $F_g = R_3 d_m^{3.5} n^2$	$G_{sl} = S_1 d_m^{-0.12}\left[(F_r + F_g)^{4/3} + S_2 F_a^{4/3}\right]$ $F_g = S_3 d_m^{3.5} n^2$
Cylindrical roller bearing	$G_{rr} = R_1 d_m^{2.41} F_r^{0.31}$	$G_{sl} = S_1 d_m^{0.9} F_a + S_2 d_m F_r$
Tapered roller bearing (The axial load coefficient of single row bearing is shown in the product table)	$G_{rr} = R_1 d_m^{2.38}(F_r + R_2 Y F_a)^{0.31}$	$G_{sl} = S_1 d_m^{0.82}(F_r + S_2 Y F_a)$
Spherical roller bearing	$G_{rr.e} = R_1 d_m^{1.85}(F_r + R_2 F_a)^{0.54}$ $G_{rr.l} = R_3 d_m^{2.3}(F_r + R_4 F_a)^{0.31}$ $If\ G_{rr.e} < G_{rr.l}$ $G_{rr} = G_{rr.e}$ $If\ not$ $G_{rr} = G_{rr.l}$	$G_{sl.e} = S_1 d_m^{0.25}(F_r^4 + S_2 F_a^4)^{1/3}$ $G_{sl.l} = S_3 d_m^{0.94}(F_r^3 + S_4 F_a^3)^{1/3}$ $If\ G_{sl.e} < G_{sl.l}$ $G_{sl} = G_{sl.e}$ $If\ not$ $G_{sl} = G_{sl.l}$
Single row spherical roller bearing	$If\ F_r < (R_2^{1.85} d_m^{0.78}/R_1^{1.85})^{2.35}$ $G_{rr} = R_1 d_m^{1.97} F_r^{0.54}$ $If\ not$ $G_{rr} = R_2 d_m^{2.37} F_r^{0.31}$	$If\ F_r < (S_2 d_m^{1.24}/S_1)^{1.5}$ $G_{sl} = S_1 d_m^{-0.19} F_r^{5/3}$ $If\ not$ $G_{sl} = S_2 d_m^{1.05} F_r$
Thrust ball bearing	$G_{rr} = R_1 d_m^{1.83} F_a^{0.54}$	$G_{sl} = S_1 d_m^{0.05} F_a^{4/3}$
Thrust cylindrical roller bearing	$G_{rr} = R_1 d_m^{2.38} F_r^{0.31}$	$G_{sl} = S_1 d_m^{0.62} F_a$
Thrust spherical roller bearing	$G_{rr.e} = R_1 d_m^{1.96}(F_r + R_2 F_a)^{0.54}$ $G_{rr.l} = R_3 d_m^{2.39}(F_r + R_4 F_a)^{0.31}$ $If\ G_{rr.e} < G_{rr.l}$ $G_{rr} = G_{rr.e}$ $If\ not$ $G_{rr} = G_{rr.l}$	$G_{sl.e} = S_1 d_m^{-0.35}(F_r^{5/3} + S_2 F_a^{5/3})$ $G_{sl.l} = S_3 d_m^{0.89}(F_r + F_a)$ $If\ G_{sl.e} < G_{sl.l}$ $G_{sl} = G_{sl.e}$ $If\ not$ $G_{sl} = G_{sl.l}$ $G_f = S_4 d_m^{0.76}(F_r + S_5 F_a)$ $G_{sl} = G_{sr} + \frac{G_f}{e^{10^{-6}(nv)^{1.4} d_m}}$

Table 3 Geometric constants of rolling and sliding frictional torque

Bearing type	Geometric constants of rolling frictional torque			Geometric constant of sliding frictional torque		
	R_1	R_2	R_3	S_1	S_2	S_3
Deep groove ball bearing	See Table 3a			See Table 3a		
Angular Contact Ball bearing						
-Single row	5.03×10^{-7}	1.97	1.90×10^{-12}	1.30×10^{-7}	0.68	1.90×10^{-12}
-Double row	6.34×10^{-7}	1.41	7.83×10^{-13}	7.56×10^{-7}	1.21	7.83×10^{-13}
-Four-point contact	4.78×10^{-7}	2.42	1.40×10^{-12}	1.20×10^{-7}	0.9	1.40×10^{-12}
Self-aligning ball bearing	See Table 3b			See Table 3b		
Cylindrical roller bearing	See Table 3c			See Table 3c		
Tapered roller bearing	See Table 3d			See Table 3d		
Spherical roller bearings	See Table 3e			See Table 3e		
Single row spherical roller bearings	See Table 3f			See Table 3f		
Thrust ball bearing	1.03×10^{-5}			1.6×10^{-2}		
Thrust cylindrical roller bearing	2.25×10^{-5}			0.154		
Thrust spherical roller bearing	See Table 3g			See Table 3g		

Table 3a Deep groove ball bearing

Bearing series	Geometric constants of rolling frictional torque		Geometric constants of sliding frictional torque	
	R_1	R_2	S_1	S_2
2, 3	4.4×10^{-7}	1	2.00×10^{-3}	100
42, 43	5.4×10^{-7}	0.96	3.00×10^{-3}	40
60, 630	4.1×10^{-7}	1.7	3.73×10^{-3}	14.6
62, 622	3.9×10^{-7}	1.7	3.23×10^{-3}	36.5
63, 623	3.7×10^{-7}	1.7	2.84×10^{-3}	92.8
64	3.6×10^{-7}	1.7	2.43×10^{-3}	198
160, 161	4.3×10^{-7}	1.7	4.63×10^{-3}	4.25
617, 618 628, 637, 638	4.7×10^{-7}	1.7	6.50×10^{-3}	0.78
619, 639	4.3×10^{-7}	1.7	4.75×10^{-3}	3.6

Table 3c Cylindrical roller bearing

Bearing series	Geometric constants of rolling frictional torque	Geometric constants of sliding frictional torque	
	R_1	S_1	S_2
N, NU, NJ and NUP bearings with cages			
2, 3	1.09×10^{-6}	0.16	0.0015
4	1.00×10^{-6}	0.16	0.0015
10	1.12×10^{-6}	0.17	0.0015
12, 20	1.23×10^{-6}	0.16	0.0015
22	1.40×10^{-6}	0.16	0.0015
23	1.48×10^{-6}	0.16	0.0015
NCF…ECJB, RN…ECJB, NJF…ECJA, RNU…ECJA or NUH…ECMH with cages			
22	1.54×10^{-6}	0.16	0.0015
23	1.63×10^{-6}	0.16	0.0015
NCF, NJG, NNCF and NNF type bearing with full roller			
All series	2.13×10^{-6}	0.16	0.0015

Table 3b Self-aligning ball bearing

Bearing series	Geometric constants of rolling frictional torque			Geometric constants of sliding frictional torque		
	R_1	R_2	R_3	S_1	S_2	S_3
12	3.25×10^{-7}	6.51	2.43×10^{-12}	4.36×10^{-3}	9.33	2.43×10^{-12}
13	3.11×10^{-7}	5.76	3.52×10^{-12}	5.76×10^{-3}	8.03	3.52×10^{-12}
22	3.13×10^{-7}	5.54	3.12×10^{-12}	5.84×10^{-3}	6.60	3.12×10^{-12}
23	3.11×10^{-7}	3.87	5.41×10^{-12}	0.01×10^{-3}	4.35	5.41×10^{-12}
112	3.25×10^{-7}	6.16	2.48×10^{-12}	4.33×10^{-3}	8.44	2.48×10^{-12}
130	2.39×10^{-7}	5.81	1.10×10^{-12}	7.25×10^{-3}	7.98	1.10×10^{-12}
139	2.44×10^{-7}	7.96	5.63×10^{-12}	4.51×10^{-3}	12.11	5.63×10^{-12}

Table 3d Tapered roller bearing

Bearing type	Geometric constants of rolling frictional torque		Geometric constants of sliding frictional torque	
	R_1	R_2	S_1	S_2
302	1.76×10^{-6}	10.9	0.017	2
303	1.69×10^{-6}	10.9	0.017	2
313 (X)	1.84×10^{-6}	10.9	0.048	2
320X	2.38×10^{-6}	10.9	0.014	2
322	2.27×10^{-6}	10.9	0.018	2
322B	2.38×10^{-6}	10.9	0.026	2
323	2.38×10^{-6}	10.9	0.019	2
323B	2.79×10^{-6}	10.9	0.030	2
329	2.31×10^{-6}	10.9	0.009	2
330	2.71×10^{-6}	10.9	0.010	2
331	2.71×10^{-6}	10.9	0.015	2
332	2.71×10^{-6}	10.9	0.018	2
LL	1.72×10^{-6}	10.9	0.0057	2
L	2.19×10^{-6}	10.9	0.0093	2
LM	2.25×10^{-6}	10.9	0.011	2
M	2.48×10^{-6}	10.9	0.015	2
HM	2.60×10^{-6}	10.9	0.020	2
H	2.66×10^{-6}	10.9	0.025	2
HH	2.51×10^{-6}	10.9	0.027	2
All other series	2.31×10^{-6}	10.9	0.019	2

Table 3e Spherical roller bearing

Bearing type	Geometric constants of rolling frictional torque				Geometric constants of sliding frictional torque			
	R_1	R_2	R_3	R_4	S_1	S_2	S_3	S_4
213E,222E	1.6×10^{-6}	5.84	2.81×10^{-6}	5.8	3.62×10^{-3}	508	8.8×10^{-3}	117
222	2.0×10^{-6}	5.54	2.92×10^{-6}	5.5	5.10×10^{-3}	414	9.7×10^{-3}	100
223	1.7×10^{-6}	4.1	3.13×10^{-6}	4.05	6.92×10^{-3}	124	1.7×10^{-3}	41
223E	1.6×10^{-6}	4.1	3.14×10^{-6}	4.05	6.23×10^{-3}	124	1.7×10^{-3}	41
230	2.4×10^{-6}	6.44	3.76×10^{-6}	6.4	4.13×10^{-3}	755	1.1×10^{-3}	160
231	2.4×10^{-6}	4.7	4.04×10^{-6}	4.72	6.70×10^{-3}	231	1.7×10^{-3}	65
232	2.3×10^{-6}	4.1	4.00×10^{-6}	4.05	8.66×10^{-3}	126	2.1×10^{-3}	41
238	3.1×10^{-6}	12.1	3.82×10^{-6}	12	1.74×10^{-3}	9495	5.9×10^{-3}	1057
239	2.7×10^{-6}	8.53	3.87×10^{-6}	8.47	2.77×10^{-3}	2330	8.5×10^{-3}	371
240	2.9×10^{-6}	4.87	4.78×10^{-6}	4.84	6.95×10^{-3}	240	2.1×10^{-3}	68
241	2.6×10^{-6}	3.8	4.79×10^{-6}	3.7	1.00×10^{-3}	86.7	2.9×10^{-3}	31
248	3.8×10^{-6}	9.4	5.09×10^{-6}	9.3	2.80×10^{-3}	3415	1.2×10^{-3}	486
249	3.0×10^{-6}	6.67	5.09×10^{-6}	6.62	3.90×10^{-3}	887	1.7×10^{-3}	180

Table 3f Single row spherical roller bearing

Bearing type	Geometric constants of rolling frictional torque		Geometric constants of sliding frictional torque	
	R_1	R_2	S_1	S_2
C22	$1.17x10^{-6}$	$2.08x10^{-6}$	$1.32x10^{-3}$	$0.8x10^{-2}$
C23	$1.20x10^{-6}$	$2.28x10^{-6}$	$1.24x10^{-3}$	$0.9x10^{-2}$
C30	$1.40x10^{-6}$	$2.59x10^{-6}$	$1.58x10^{-3}$	$1.0x10^{-2}$
C31	$1.37x10^{-6}$	$2.77x10^{-6}$	$1.30x10^{-3}$	$1.1x10^{-2}$
C32	$1.33x10^{-6}$	$2.63x10^{-6}$	$1.31x10^{-3}$	$1.1x10^{-2}$
C39	$1.45x10^{-6}$	$2.55x10^{-6}$	$1.84x10^{-3}$	$1.0x10^{-2}$
C40	$1.53x10^{-6}$	$3.15x10^{-6}$	$1.50x10^{-3}$	$1.3x10^{-2}$
C41	$1.49x10^{-6}$	$3.11x10^{-6}$	$1.32x10^{-3}$	$1.3x10^{-2}$
C49	$1.49x10^{-6}$	$3.24x10^{-6}$	$1.39x10^{-3}$	$1.5x10^{-2}$
C59	$1.77x10^{-6}$	$3.81x10^{-6}$	$1.80x10^{-3}$	$1.8x10^{-2}$
C60	$1.83x10^{-6}$	$5.22x10^{-6}$	$1.17x10^{-3}$	$2.8x10^{-2}$
C69	$1.85x10^{-6}$	$4.53x10^{-6}$	$1.61x10^{-3}$	$2.3x10^{-2}$

Table 3g Thrust spherical roller bearing

Bearing type	Geometric constants of rolling frictional torque				Geometric constants of sliding frictional torque				
	R_1	R_2	R_3	R_4	S_1	S_2	S_3	S_4	S_5
292	$1.32x10^{-6}$	1.57	$1.97x10^{-6}$	3.21	$4.53x10^{-3}$	0.26	0.02	0.1	0.6
292E	$1.32x10^{-6}$	1.65	$2.09x10^{-6}$	2.92	$5.98x10^{-3}$	0.23	0.03	0.17	0.56
293	$1.39x10^{-6}$	1.66	$1.96x10^{-6}$	3.23	$5.52x10^{-3}$	0.25	0.02	0.1	0.6
293E	$1.16x10^{-6}$	1.64	$2.00x10^{-6}$	3.04	$4.26x10^{-3}$	0.23	0.025	0.15	0.58
294E	$1.25x10^{-6}$	1.67	$2.15x10^{-6}$	2.86	$6.42x10^{-3}$	0.21	0.04	0.2	0.54

● Friction torque of seals

For bearings with contact seals, the friction losses caused by seals may be greater than that caused by bearing. For bearings with seals on both sides, the friction torque of seals can be estimated by the following empirical formula.

$M_{seal} = K_{s1} d_s \beta + K_{s2}$

In the formula:

M_{seal} : Friction torque of seals, Nmm

K_{s1}: Constants according to bearing type

K_{s2} : Constants according to bearing and seal type

d_s: Bearing shoulder diameter, mm can be found in the product table

β : Index according to bearing and seals type

K_{s1} , K_{s2} and β is constant

M_{seal} : It is the friction torque generated by the seals on both sides. If the bearing is sealed on only one side, the friction torque should be $0.5M_{seal}$

For deep groove ball bearings with RSL type seals and outer diameter greater than 25mm, the calculated value of M_{seal} shall be used for either one or both sides with seals.

● Other factors of friction torque

Other factors include

- ▸Cut-in heating
- ▸Air-oil lubrication, oil spray lubrication, low-oil-level oil bath lubrication and lean oil backfill effect in case of grease
- ▸Drag loss in oil bath lubrication
- ▸Mixed lubrication state at low speed or low viscosity

Taking the above other factors into account, the formula of bearing total friction torque can be written:

$M = \Phi_{ish} \Phi_{rs} M_{rr} + M_{sl} + M_{seal} + M_{drag}$

In the formula:

M: Total friction torque, Nmm

$M_{rr} : G_{rr} (vn)^{0.6}$

$M_{sl} : G_{sl} \cdot \mu_{sl}$

$M_{seal}: K_{seal}\beta + K_{s2}$

M_{drag} : Friction torque caused by drag loss, eddy current and spatter, Nmm

Φ_{ish} : Reduction coefficient of cut-in heating

Φ_{rs} : Reduction coefficient of lean oil backfill

Φ_{ish} and Φ_{rs} are respectively used to consider the effects of rolling friction in cut-in heating and lean oil backfill. For low speed or low viscosity, the sliding friction coefficient μ_{s1} is used to reflect the effect of mixed lubrication.

● Reduction coefficient of cut-in heating

When the bearing is fully lubricated, not all lubricants can pass through the contact site, only a very small amount of lubricants are used to form the oil film. Therefore, part of the lubricating oil near the oil inlet of the contact part is repelled and produces a backflow (see Fig. 1)

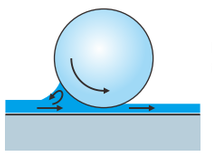


Fig. 1 Lubricant backflow

Backflow of lubricant will generate heat internally due to shear action, reduce the viscosity of lubricating oil as well as reduce the thickness of oil film and the effect of rolling friction. For the above effects, the approximate value of the cut-in heating reduction coefficient can be calculated from the following formula.

$$\phi_{ish} = \frac{1}{1 + 1.84 \times 10^{-9} \left(n d_m\right)^{1.28} v^{0.64}}$$

In the formula:

Φ_{ish} : Reduction coefficient of cut-in heating

n: speed, r/min

d_m: Average bearing diameter, mm

V: Kinematic viscosity of lubricant at operating temperature, mm^2/s (it is the viscosity of base oil in the case of grease)

Reduction coefficient of cut-in heating Φ_{ish}, whose value can be obtained from Figure 2, is the function of a combination parameter $(nd_m)^{1.28}v^{0.64}$.

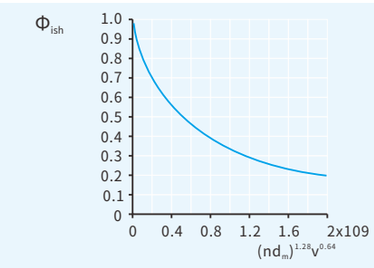


Fig. 2 Coefficient of reduction in cut-in heating Φ_{ish}

Reduction coefficient of lean oil backfill

Under the conditions of air-oil lubrication, oil spray lubrication, low-oil-level oil bath lubrication (that is, the oil level is lower than the center of the lowest rolling element) and grease lubrication, excessive lubricant may be squeezed out when the roller is repeatedly pressed across the raceway. It is also possible that due to the high speed of the bearing or high viscosity of the lubricant, the lubricant at the edge of the contact site may not have enough time to replenish the raceway, thus resulting in a reduction in the thickness of the oil film and rolling friction, which is called “running lean oil”. For the above lubrication conditions, the approximate reduction coefficient of lean oil backfill can be calculated from the following formula.

$$\phi_{rs} = \frac{1}{e^{K_{rs} v n (d+D) \sqrt{\frac{K_z}{2(D-d)}}}}$$

In the formula:

Φ_{rs} : Reduction coefficient of lean oil backfill

e: Base of natural logarithm = 2.718

K_{rs}: Lean oil backfill constant

$3x10^{-8}$, low-oil-level oil bath lubrication and oil spray lubrication

$6x10^{-8}$, Grease and air-oil lubrication

K_z: The geometric constants determined according to different bearing types are shown in Figure 3.

v: Viscosity of lubricant at operating temperature, mm^2/s

n: speed, r/min

d: Bearing inner diameter, mm

D: Bearing outer diameter, mm

Geometric constant used to calculate drag loss K_z and K_L

Bearing type	Geometric constant	
	K_z	K_L
Deep groove ball bearing		
—single row and double row	3.1	—
Angular contact ball bearing		
—single row	4.4	—
—double row	3.1	—
—4 point contact	3.1	—
Self-aligning ball bearing	4.8	—
Cylindrical roller bearing		
—single row and double row	5.1	0.65
—full roller, single row and double row	6.2	0.7
Tapered roller bearing	6	0.7
Spherical roller bearing	5.5	0.8
CARB		
—bearing with cage	5.3	0.8
—full roller	6	0.75
Thrust ball bearing	3.8	—
Thrust cylindrical roller bearing	4.4	0.43
Thrust spherical roller bearing	5.6	0.58

Fig. 3 Drag loss in the oil lubrication

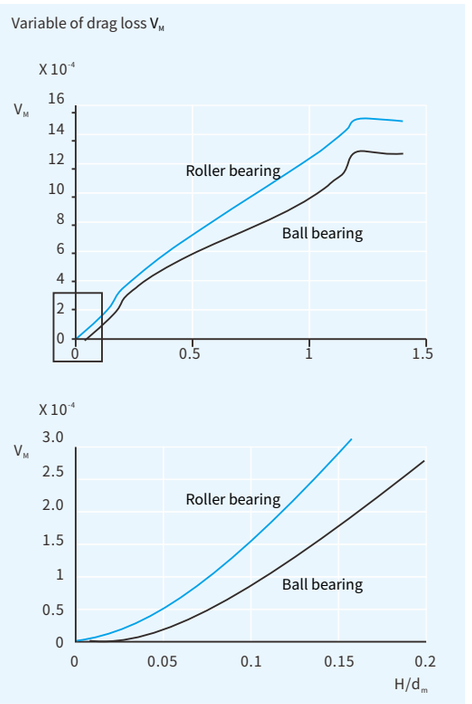


Fig. 4

The drag loss in oil bath lubrication

The drag loss in oil bath lubrication is the factor that affects the total friction torque the most among other effects. Therefore, the friction torque caused by the drag loss is expressed as an independent M_{drag}.

In oil bath lubrication, part of the bearing is submerged. Or in some special cases, the bearings are completely submerged. In these cases, the size, geometry and oil level of the oil reservoir will have a substantial effect on the friction torque of the bearing. For very large oil baths, it is not necessary to consider the interaction of the size of the oil sump, nor the effects of other mechanical elements (such as: oil agitators, gears or cams) working near the bearings. The drag loss variable in the bearing V_M (Fig. 4) is a function of the oil level H (Fig. 5) and the average bearing diameter d_m= 0. 5 (d + D). Fig.4 applies to bearings at their reference speed or speed below. At higher speeds or higher oil levels, other factors can have a greater impact.

Using V_M in Fig. 4, the friction torque caused by the bearing and the drag loss can be calculated.

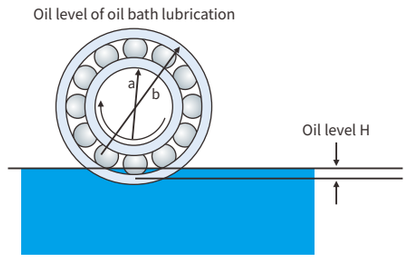


Fig. 5

For ball bearing

$M_{drag}=V_M K_{ball} d_m^5 n^2$

For roller bearing

$M_{drag}=10 V_M K_{roll} d_m^4 n^2$

In the formula:

M_{drag}: Friction torque caused by drag loss, Nmm

V_M: Variable of drag loss, is the function of H (Figure 5) and d_m,

K_{ball}: Constant used in ball bearing

K_{roll}: Constant used in roller bearing

d_m: Average diameter of bearing, mm

B: Width of inner ring, mm

n: Rotation speed, r/min

Variable value V_M can be figured out from Fig.4: black curve is applicable to ball bearing, and blue curve is used in roller bearing.

The constant value used in ball bearing could be figured out by the follow formula:

$$K_{ball} = \frac{i_{rw} K_z (d+D)}{D-d} \times 10^{-12}$$

The constant value used in roller bearing could be figured out by the follow formula:

$$K_{roll} = \frac{K_L K_z (d+D)}{D-d} \times 10^{-12}$$

In the formula:

K_{ball}: Constant used in ball bearing

K_{roll}: Constant used in roller bearing

i_{rw}: Row of ball

K_z: Geometric constant figured out by the bearing type

K_L: Geometric constant figured out by the roller bearing type

d: Inner ring diameter, mm

D: Outer ring diameter, mm

Note: When calculating the lubrication of spray oil, the method of oil bath lubrication calculation could be used, taking half length of roller as oil position, then multiply the M_{drag} with 2.

7.3 Lubrication

7.3.1 Lubrication of bearing

The purpose of bearing lubrication is to separate rollers from rolling surface by a thin oil film during running, thus reducing the internal friction of the bearing and abrasion between components as well as prevent heat.

Its primary functions are as follows:

1) To lubricate every component of bearings, prevent metallic contact, and reduce friction, abrasion etc.

2) Keep the appropriate oil film on the rolling contact surface of bearing, and prolong the bearing life.

3) Carry away heat either generated by friction or outside as well as prevent lubricating oil from aging.

4) Prevent dirt or other foreign matter from intruding into the interior of the bearing and occurrence of rust and corrosion.

7.3.2 Lubricating method

The lubricating methods of bearings are divided into grease lubrication and oil lubrication. In order to maximize the function of bearing, first proper lubricating method that meets working conditions should be chosen. If only the lubricating effect is considered, oil lubrication is more advantageous. Yet grease lubrication is also widely used as it has the advantage of simplifying working conditions. In recent years, sealed structures that use lubricating grease have been increasingly adopted. Table 7.6 makes a comparison of the advantages and disadvantages of oil lubrication and grease lubrication.

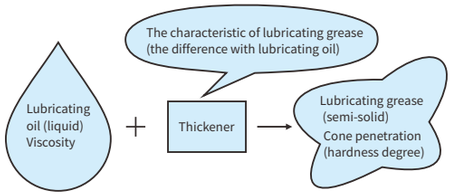
Table 7.6 Comparison of oil lubrication and grease lubrication

Item	Oil lubrication	Grease lubrication	
		Open bearing	Sealed bearing
Shell structure sealing device	Maintenance difficulty	Can be simplified	More simplified
Rotational speed	Applicable to high-speed rotation	Speed limit is 65-80% of oil lubrication	
Cooling effect	Can carry away heat	None	None
Replacement of lubricating grease	Relatively simple	Relatively difficult	No need for replacement
Control of dust and impurities	Relatively simple	Difficult	Professional control effect
Leakage	Relatively simple	Leakage exists	Not easy

7.3.3 Lubricating grease

Lubricating grease is the semisolid lubricant which use lubricating oil as its base oil and incorporate solid lipophilic thickener. Sometimes various additives are mixed into the grease to promote certain characteristics.

See A81 for details of typical lubricating grease of bearing.



1) Base oil

The base oil of lubricating grease mostly use mineral oil, yet when special performances like low-temperature fluidity or high temperature stability are required, synthetic oil such as diester oil, silicone oil, polyethylene diester oil and fluorocarbon oil etc. will be used as well.

Generally speaking, lubricating grease made of low viscosity base oil applies to high-speed bearings and low temperature conditions while those made of high viscosity base oil applies to heavy loading bearings and high temperature conditions.

2) Thickener

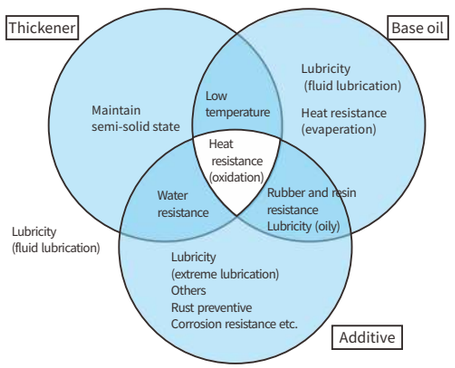
The thickener agent of lubricating grease mostly comprises of metallic soap base like lithium, calcium and sodium etc. Yet according to different purposes, thickener with non-metallic soap base (inorganic substance such as silica gel, bernton etc..) will be used as well. Generally, the characteristic of lubricating grease are determined by thickener such as mechanical performance, stability, scope of service temperature, and water resistance etc..

Lithium based grease: superior in heat resistance, water resistance and mechanical stability

Calcium grease: superior in water resistance, inferior in heat resistance

Sodium grease: superior in heat resistance, inferior in water resistance

Nonmetal soap grease: superior in heat resistance



3) Additive

According to the application conditions, different lubricant additives may be used.

Extreme-pressure additive: when bearing takes heavy load or impact load

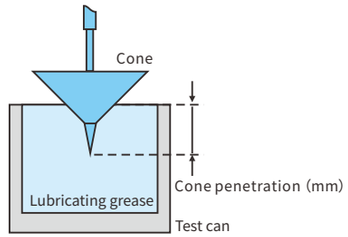
Antioxidation inhibitors: No supply of lubricant for long period

Other additives include structure stabillization agent, rust preventive and corrosion inhibitors etc..

The relationship among base oil, thickener and additive are shown in following figure.

4) Consistency

The hardness of lubricating grease is described by consistency, which is calculated by multipling 10 times the depth (in mm) of which the cone shaped metallic plunger penetrates into the grease by dead weight in 5 seconds. Therefore, the softer the grease, the higher the figure.



Cone penetration type

No.	Depth	Hardness
No. 000	445~475	soft
00	400~430	
0	355~385	
1	310~340	
2	265~295	
3	220~250	
4	175~205	
5	130~160	
6	85~115	hard

5) Mixing of different grease

The mixing use of different greases could change its properties. Thus normally different greases should not be mixed. If mixing grease is unavoidable, the grease with same thickener shall be chosen. Yet it should be noticed that even in this way negative effects may occur due to the difference of additives. Therefore, testing of mixture use shall be carried out in advance.

7.3.4 Grease lubrication

Grease lubrication has the advantage that there is no need for replenishment over a long period once grease is filled and the seal structure is relatively simple. Therefore, grease lubrication is commonly used.

Grease can be filled in sealed/shielded type bearing beforehand. Alternatively, filling in right amount of grease in housing, and refilling at a regular intervals via replenishment or replacement is another method.

Moreover, for machinery that has many bearings to be lubricated, grease-feeding devices connected by piping could be adopted to collectively supply the grease.

1) Amount of grease

The amount of grease in the housing varies with differences in bearing rotation speed, shell structure, volume, trademark of grease and working temperature etc. Generally the standards are as follows:

First of all, fill grease into inside space of bearing and make sure it flows into the guide surface of cage. Then fill in grease according to available inside space of housing.

1/2 - 2/3 grease(below 50 % of limit rotation speed)

1/3 - 1/2 grease(above 50 % of limit rotation speed)

2) Replenishment of grease

Generally it is unnecessary to refill once grease is filled. Yet sometimes it is necessary for replenishment or replacement. Therefore, the design of housing should be convenient for grease refilling. The time interval is shown in Figure 7.8.

On condition that supply intervals are short, designing supply inlets and outlets at the proper location within the housing is needed to replace the degraded grease with new grease.

For example, the inside of the housing is divided by grease sectors. As long as one part is filled up, the lubricating grease can flow into inside space of bearing. The grease forced out of the bearing is discharged through a grease valve. On occasions that a lubricating valve is not used, a larger housing space on the discharge side to store old grease shall be designed. The discharge grease would then be taken out regularly by removing the housing cover regularly.

3) Grease life for sealed/shielded ball bearing

The grease life of sealed single-row deep groove ball bearing can be calculated approximately by the following two equation:

General grease (1)

$$Logt=6.54-2.6n/N_{max}-(0.025-0.012n/N_{max})T$$

High quality grease (2)

$$Logt=6.12-1.4n/N_{max}(0.018-0.006n/N_{max})T$$

In the equation:

t: mean grease life, h

n: rotation speed of bearing, r/ min

T: working temperature of bearing, °C

N_{max}: limit rotation speed of grease, r/ min

(Value of ZZ type and 2RZ type listed in bearing specification table)

Explanations:

A) When $n/N_{max}<0.25$, n/N_{max} should be 0.25.

B): Working temperature of bearing

General grease: 70°C≤T≤110°C

High quality grease: 70°C ≤T≤130°C

When T< 70°C, T=70°C shall be adopted.

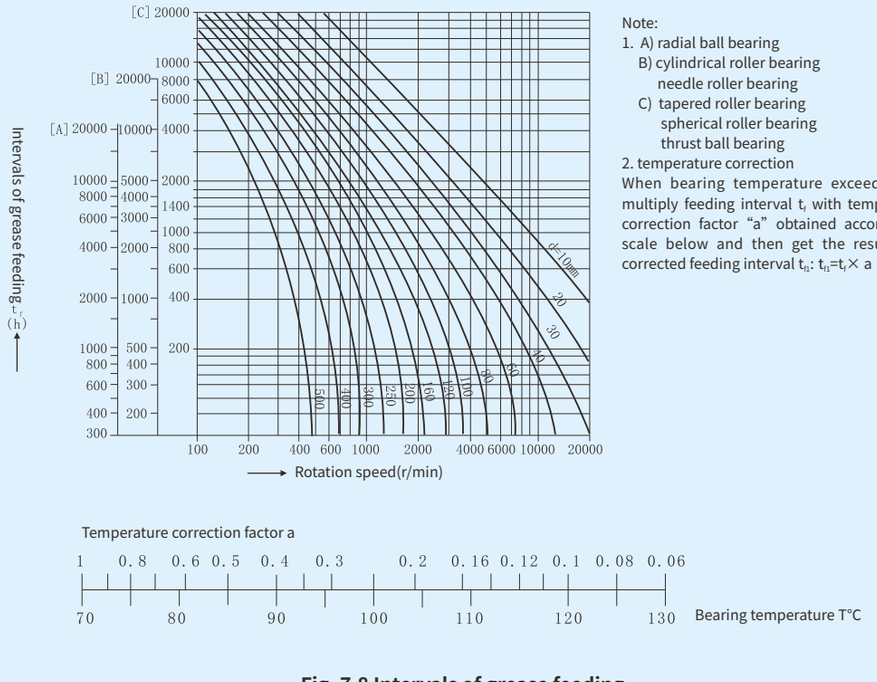
C) Bearing load

Bearing load for basic dynamic load rating is around 0.1 or less than 0.1.

Remarks:

(1) General grease applicable to grease of mineral oil type between -10°C and 110°C.

(2) High quality lubricating grease applicable to grease of synthetic oil type between -40°C and 130°C.



Note:

1. A) radial ball bearing
   B) cylindrical roller bearing
      needle roller bearing
   C) tapered roller bearing
      spherical roller bearing
      thrust ball bearing
2. temperature correction

When bearing temperature exceeds 70°C, multiply feeding interval t_f with temperature correction factor "a" obtained according to scale below and then get the result. The corrected feeding interval t_{fi}: $t_{fi}=t_f \times a$

Fig. 7.8 Intervals of grease feeding

Brands and performance of lubricating grease for rolling bearing

Lubricating grease name	Manufacturer	Base oil	Thickener	Consistency	Dropping point		Service temperature range	Color	Features				
									Water resistance	High-speed running	Tone	Low temperature torque	Load
H100	Germany	Synthetic oil	Polyurea	265-296	⩾250		-40～180	Yellow brown	√	√	√		
G114	USA	Mineral oil	Lithium	265-295	＞175		-30～130	black	√				√
H103A	USA	Synthetic oil	Polyurea	280	＞260		-40～180	Light brown	√	√			
G160	Germany	Mineral oil, synthetic hydrocarbon oil	Polyurea	265-295	＞250		-30～160	Brown	√		√		
G075A	USA	Mineral oil	Lithium	285	185		-25～120	Yellow brown			√		
G078	Netherlands	Mineral oil	Lithium	280	180		-20～120	Red brown					√
HQ023	Japan	Diester	Lithium	275	195		-50～130	Milky		√	√	√	
HQ026	Japan	Polyhydroxyester	Lithium	244	190		-50～150	Light yellow	√		√	√	
H095	Japan	Polyphenylene ether oil	Polyurea	300	230		-40～180	Milky	√	√			√
S048	Japan	Synthetic hydrocarbon oil	Polyurea	220	260		-40～160	Light brown	√	√	√	√	
G100	Japan	Mineral oil, synthetic hydrocarbon oil	Polyurea	260	253		-30～160	Light brown	√		√		
G130	Japan	Mineral oil	Lithium	278	199		-20～120	Brownish green					√
S043	Japan	Mineral oil, synthetic hydrocarbon oil	Polyurea	240	270		-30～160	Light brown		√	√		
G100A	USA	Mineral oil	Polyurea	280	243		-30～150	Green	√				√
G110A	Japan	Mineral oil	Lithium	278	192		-20～120	Light brown			√		
G115A	USA	Mineral oil	Poly oil	265-295	288		-30～150	Light brown	√				

Remarks:
(1) Bearing internal lubricating grease feeding amount is strictly controlled according to design requirements;
(2) Different lubricating grease types are not allowed to be mixed. The mixture property of same type does not change much;
(3) Mineral oil grease will cause damage to plastic material, and esters will cause damage to acrylic ester and ABS. Be precautions while using;
(4) In case of extraordinarily high temperature, high speed or other special operating ambience, please contact C&U R&D.

7.3.5 Lubricating oil

Generally oil lubrication of the bearing adopts the refined mineral oil which has good oxidation stability, antirust and high oil film strength. Yet different kinds of synthetic oil are often used and sometimes various additives, rust preventives, and antifoaming agents are added in order to promote some characteristics. The characteristics of normal type lubricant are shown in Table 7.7.

7.3.6 Oil lubrication

Generally oil lubrication of rolling bearings adopts mineral oil which is free of additives. Lubricating oil with additives is only used in special conditions to promote performance, such as extreme pressure resistance and age resistance. Synthetic oil is only used when temperature and rotation speed is too high or too low.

Viscosity is one of the important characteristics of lubricating oil and is the main principle for selecting proper lubricating oil. The viscosity of lubricating oil is related to temperature and it drops in response to temperature rise. Lubricating oil must maintain certain viscosity at work temperature for sufficient lubricating oil film between the rollers and raceway contact surface. If viscosity is too low, adequate oil film will not form, resulting in abrasion or shorter life. While if viscosity is too high, it will cause heat generation through viscosity resistance and enlarge power waste.

Generally speaking, low viscosity oil should be chosen if working speed is high; while high viscosity lubricating oil should be used when bearing dimension and load is large. Lubricating oil adopted by different types of bearing should possess the viscosity illustrated in Table 7.8 under its working temperature.

Table 7.8 Viscosity required by different bearings

Bearing type	Lubricant viscosity
Ball bearing	⩾13mm²/s
Roller bearing, spherical roller bearing	⩾20mm²/s
Spherical trust roller bearing	⩾32mm²/s

Fig.7.9 is the graph of relation between lubricating oil viscosity and temperature, which is designed to select lubricating oil viscosity in accordance with its running temperature. Table 7.9 lists the selection of lubricating oil viscosity for all types of bearings under different working conditions.

Table 7.7 Characteristics of lubricating oil

Variety of lubricating oil	Refined mineral oil	Synthetic oil				
		Diester oil	Silicone oil	Polyethylene diester oil	Polyethylene aether oil	Fluorocarbon oil
Service temperature scope	-40~+220	-50~+150	-70~+350	-30~+330	0~+330	-20~+300
Lubricity	Good	Good	Bad	Good	Good	Excellent
Oxidation stability	Bad	Good	Good	Good	Excellent	Excellent
Proof radioactivity	Unacceptable	Unacceptable	Unacceptable	Unacceptable	Excellent	–

Table 7.9 Selection of suitable viscosity of lubrication oil

Bearing running temperature °C	dn value	Lubricating oil ISO viscosity class (VG)		Applicable bearing
		Normal load	Heavy load or impact load	
-30~0	To permitted rotation speed	22 32	46	All types
0~60	To 15000	46 68	100	All types
	15000~80000	32 46	68	All types
	80000~150000	22 32	32	Except thrust ball bearing
	150000~500000	10	22 32	Single-row ball bearing, cylindrical roller bearing
60~100	To 15000	150	220	All types
	15000~80000	100	150	All types
	80000~150000	68	100 150	Except thrust ball bearing
	150000~500000	32	68	Single-row ball bearing, cylindrical roller bearing
100~150	To permitted rotation speed	320		All types
0~60	To permitted rotation speed	46	68	Single-row ball bearing, cylindrical roller bearing
60~100	To permitted rotation speed	150		

7.3.7 Oil change period

Oil change period depends on running conditions and oil amount. When working temperature does not exceed 50°C and there is not much dust, it can be changed once a year.

The higher the working temperature is, the more frequency the oil shall be changed. For example: when working temperature reaches 100°C, it shall be changed every three months. In severe running conditions, the frequency of oil change shall be increased.

For circulation oil lubrication and jet lubrication, oil change period depends on oil circulation speed and whether the lubricating oil has been cooled, Which is primarily determined by experimental runs and regular check upon the oil status. In case of any special cases, please contact with C&U.

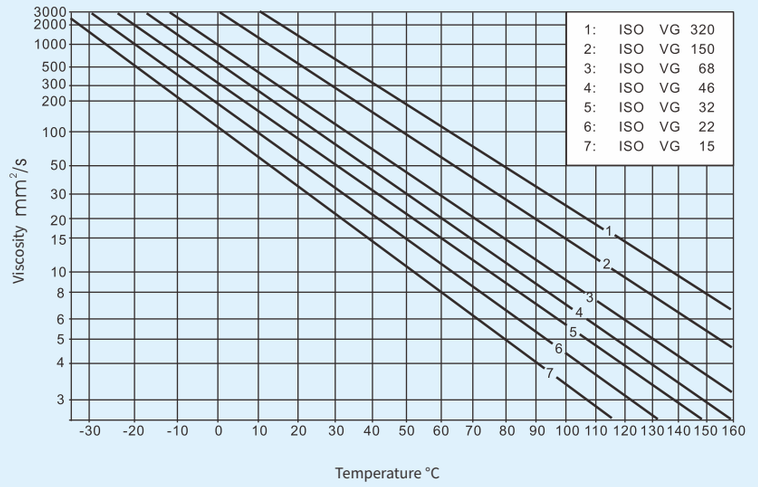


Fig. 7.9 Corresponding relational graph between lubricating oil viscosity and temperature

8. Materials of bearings

8.1 Materials of rings and rolling elements

Rolling bearings need to endure high contact stresses while also maintaining high precision during rotation. Therefore, the materials of the rings and rolling elements should have high hardness, strong rolling fatigue resistance and wear resistance, good dimensional stability and other characteristics. Non-metallic inclusions can allow fatigue cracking to occur more easily, so life of bearings can be extended by increasing purity of the material (reducing non-metallic inclusions). C&U bearings utilize vacuum smelting and electroslag remelted bearing steel to more strictly control oxygen content and non-metallic inclusions. Working closely with its steel suppliers, C&U has developed various high purity steel levels to provide high reliability and long life in demanding applications. For more specific details, please consult the C&U R&D Center.

● Induction hardened bearing steel

The surface induction hardening process provides a hard surface and case depth to support the loads applied to the bearing, while also allowing a softer core for increased bending strength. Steel grade and manufacturing process is optimized to take advantage of this process.

C&U's flanged wheel hub bearings are an example of the use of induction hardening, in which the non-hardened flange is designed to improve structural fatigue while the rolling contact fatigue of the bearing raceway is optimized.

● Ceramic

Ceramics used for manufacturing bearing rings and rolling bodies are silicon nitride which can meet the working characteristics of rolling bearings. Since the ultra-fine elongated grain of β-silicon nitride is composed in the glass matrix, it has multiple advantages for rolling bearings, such as high hardness, low density, low thermal expansion, high resistivity, low dielectric constant and free from magnetic field impact.

Table 8.1 Main physical parameters and mechanical properties of GCr15

Physical parameters (measured in annealing state)	Melting point(℃)	T_c=1395~1403	Density (g/cm^3)	ρ = 7.81
	Critical point(℃)	A_{c1}≈760	Linear expansion coefficient (1/K)	α = 13.3×10^{-6}
		A_{cm}≈900	Thermometric conductivity [W/(m•K)]	λ = 40.11
		A_{c3}≈707	Poisson ratio(28~ 125°C)	μ = 0.29
		A_{r1}≈695	Elasticity modulus (Gpa)	E = 207
Mechanical properties		780°C annealing	900°C annealing	840°C oil quenching 150°C tempering
	Tensile strength δb (Mpa)	588~715	1186~1260	2157~2550
	Yield pointσ σ_s (Mpa)	353~412		1667~1814
	Extensibility δ(%)	15~25		—
	Contractility ψ(%)	25~59		—
	Impact toughness α_k(J/ cm^2)	48~88		5.4~8.4
	Hardness (HRC)	179~207HBS		61~65 HRC

Table 8.2 Steel grades of different kinds of high-carbon chrome bearing steel

China	U.S.A.		Japan	Germany		SKF	International standard
GB/YB	SAE	AISI	JIS	DIN	Material type		ISO
Gcr15	52100	E52100	SUJ2	100Cr6	1.3505	SKF3	1
Gcr15SiMn	——	——	SUJ5	100CrMo6	1.3520	SKF832	3
Gcr18Mo	——	——	SUJ4	——	——	SKF24	——

● High carbon chromium bearing steel

The most commonly used bearing steel meets the GB/T 18254 standard and contains 1.0% carbon and 1.5% chromium. This steel is usually heat treated to result in a martensite or lower bainite microstructure with hardness ranging from 58 to 65 HRC. With continuous improvements in steel smelting technology, the controls of oxygen content and non-metallic inclusions has greatly improved bearing life in recent years.

● Carburized bearing steel

Carburizing of bearing steel provides a hard surface and case depth to support the loads applied to the bearing, while also allowing a softer core for increased bending strength. The softer core provides good toughness and impact resistance. This process is recommended for situations with large interference, high impact loads, or high bending stresses.

Table 8.3 Chemical composition of high-carbon chrome bearing steel (GB /T 18254-2016)

Brand	C	Si	Mn	Cr	Mo	P	S	Ni	Cu	Ni+Cu
Gcr15	0.95~1.05	0.15~0.35	0.25~0.45	1.40~1.65	≤0.10	≤0.025	≤0.02	≤0.25	≤0.25	0.5
Gcr15SiMn	0.95~1.05	0.45~0.75	0.95~1.25	1.40~1.65	≤0.10	≤0.025	≤0.02	≤0.25	≤0.25	0.5
Gcr15SiMo	0.95~1.05	0.65~0.85	0.20~0.40	1.40~1.70	0.30~0.40	≤0.025	≤0.02	≤0.25	≤0.25	
Gcr18Mo	0.95~1.05	0.20~0.40	0.25~0.40	1.65~1.95	0.15~0.25	≤0.025	≤0.02	≤0.25	≤0.25	

Table 8.4 Chemical composition of carburized steel（GB 3203-2016）

Brand	Chemical composition								
	C	Si	Mn	Cr	Ni	Mo	Cu	P	S
G20CrMo	0.17~0.23	0.20~0.35	0.65~0.95	0.35~0.65	≤0.30	0.08~0.15	≤0.25	0.02	0.015
G20CrNiMo	0.17~0.23	0.15~0.40	0.60~0.90	0.35~0.65	0.40~0.70	0.15~0.30	≤0.25	0.02	0.015
G20CrNi2Mo	0.19~0.23	0.25~0.40	0.55~0.70	0.45~0.65	1.60~2.00	0.20~0.30	≤0.25	0.02	0.015
G20Cr2Ni4	0.17~0.23	0.15~0.40	0.30~0.60	1.25~1.75	3.25~3.75	≤0.08	≤0.25	0.02	0.015
G10Cr2Mn2Mo	0.08~0.13	0.15~0.40	0.40~0.70	1.00~1.40	3.00~3.50	0.08~0.15	≤0.25	0.02	0.015
G20Cr2Mn2Mo	0.17~0.23	0.15~0.40	1.30~1.60	1.70~2.00	≤0.30	0.20~0.30	≤0.25	0.02	0.015
G23Cr2Ni2Si1Mo	0.20~0.25	1.20~1.50	0.20~0.40	1.35~1.75	2.20~2.60	0.25~0.35	≤0.25	0.02	0.015

● High temperature bearing steel
General high carbon chromium bearing steel, after standard heat treatment, if used for a long time at high temperature above 120°C, will produce unacceptable size changes.
Bearings working in high temperature environment should adopt bearings after special heat treatment, but this treatment will reduce the hardness of materials, thereby reducing the fatigue life of bearings.
Bearings that require long working time above 250°C are recommended to be made of alloy steels containing wolfram (W) and vanadium (V).
● Stainless bearing steel
Martensitic stainless steel is used in applications requiring high rust resistance.
In some applications, anticorrosive coatings can replace stainless steel.

Table 8.5 chemical composition of high temperature bearing steel

Standard	Brand	Chemical composition									
		C	Si	Mn	Cr	Ni	Mo	V	Cu	P	S
YB/T688	Cr14Mo4V	0.10~0.75	≤0.35	≤0.35	3.75~4.25	≤0.20	4.00~4.50	0.90~1.10	≤0.20	≤0.020	≤0.027
YB/T1205	Cr14Mo4V	0.95~1.10	0.95~1.10	0.95~1.10	0.95~1.10	0.95~1.10	0.95~1.10	0.95~1.10	≤0.25	≤0.020	≤0.025

Table 8.6 Chemical composition of stainless bearing steel

Standard	Brand	Chemical composition						
		C	Si	Mn	Cr	S	P	Mo
GB/T3086	9Cr18	0.90~1.00	≤0.80	≤0.80	17.0~19.0	≤0.030	≤0.035	-
	9Cr18Mo	0.95~1.10	≤0.80	≤0.80	16.0~18.0	≤0.030	≤0.035	0.40~0.70

8.2 Materials of cages

● Stamping steel cage
Most of the stamped steel cages are made of hot rolled low carbon steel sheets. These cages have high strength and can be surface treated to reduce friction and wear.
Stamping cages in stainless steel bearings are usually made of stainless steel.

● Machine steel cage
Machine steel cages are usually made of non-alloy structural steel. Some of them need surface treatment to improve sliding and wear resistance.
Machine steel cages are generally used for super large bearings, or in situations where brass cages are not suitable, such as natural cracking of brass due to chemical reactions.
The maximum working temperature of steel cage is +300°C.

● Machine brass cage
Most brass cages are made of cast or forged copper and are free from the influence of lubricants. Brass cages are not suitable for working temperature above 250°C.

● Polymer plastic cage
Nylon 66
Most molded cages are made of nylon 66 with glass fiber reinforcement, which has good strength and elasticity.
Nylon 66 is more sensitive to temperature than stamped steel, so is used for cages whose working temperatures are typically below 120°C, as aging of the nylon material will occur more quickly as time goes and temperature increases.
Reinforced glass fiber nylon 66 should not be used for bearings operating continuously at temperatures below -40°C.
Nylon 46
Reinforced glass fiber nylon 46 is standard cage material for small and medium-sized bearings. The operating temperature of this cage is 15°C higher than that of nylon 66.
Poly-ether-ether-ketone (PEEK)
PEEK is used for higher requirement working conditions, such as high speed, high temperature or chemical corrosion.
PEEK material is the combination of multiple excellent characteristics, such as strength and elasticity, high working temperature range, high chemical corrosion resistance, abrasion resistance and good processing performance.
PEEK will not age at temperatures below 200°C or in lubricants with additives. However, under the condition of high speed, the working temperature can not exceed 150°C , or the general polymer materials will begin to soften.

● Phenolic resin cage
The lightweight fiber reinforced phenolic resin cage can withstand high centrifugal force and acceleration force, but can not withstand high temperature. Most precision angular contact ball bearings are made of phenolic resin.

Table 8.7 Chemical composition of metallic material of normal cages

Brand	Chemical composition				
	C	Si	Mn	P	S
08(GB)	0.05~0.12	0.17~0.37	0.35~0.65	≤0.035	≤0.035
10(GB)	0.07~0.14	0.17~0.37	0.35~0.65	≤0.035	≤0.035
ST12(DIN)	≤0.10	≤0.04	≤0.50	≤0.035	≤0.035
ST14(DIN)	≤0.08	≤0.03	≤0.40	≤0.025	≤0.020
SPCC(JIS)	≤0.12	≤0.04	≤0.50	≤0.04	≤0.045

8.3 Material of seals

C&U seals are usually made of synthetic rubber. Seals are usually made of the following materials:
● Nitrile-butadiene rubber (NBR)
NBR (Acrylonitrile butadiene rubber) is a general sealing material, which is synthesized from acrylonitrile and butadiene. It has good resistance to the following media.
• Most mineral oils and greases
• General fuels, such as gasoline, diesel and lightweight civilian fuels
• Animal oil, vegetable oil and fat
• Hot water
NBR seals can operate for a short time without lubrication. The optimal working temperature range is -40°C to 100°C, although NBR can withstand a maximum temperature of over 120°C for short period of time.

● Hydrogenated nitrile-butadiene rubber (HNBR)
HNBR has better wear resistance than NBR, so the seals made of HNBR have longer working life. In addition, HNBR has stronger heat resistance, aging resistance and hardening resistance in hot oil or ozone. The mixture of air and oil has a negative impact on the life of seals. The maximum allowable temperature of HNBR is +150°C, which is much higher than that of NBR.

● Fluororubber(FKM/FPM)
The main characteristics of FKM are high temperature and corrosion resistance, good aging and ozone resistance, and very low permeability. Even in very bad working conditions, it still has very good wear resistance. FKM can withstand working temperatures of +200°C or below, and can also allow short-term oil-free operation.
When the temperature exceeds +300°C, FPM will release harmful gases. Therefore, precautions should be taken when dealing with the seals made of FPM.

● Polyurethane (AU)
Polyurethane is a kind of wear-resistant organic material with good elasticity. Its working temperature ranges from -20°C to + 80°C. It has good resistance to mineral oil grease, mineral oil containing little or no extreme pressure(EP) additives, water or water-oil mixture, etc., but it can not resist acids, alkalis or polar solvents and other substances.

● Polyacrylate rubber (ACM)
ACM has excellent heat resistance and ozone resistance performance, especially for thermal oxidative aging resistance, and its maximum operating temperature is 180°C. ACM also has outstanding swelling resistance to hydrocarbon oil. Its oil resistance performance at room temperature is comparable to that of NBR, but its heat resistance is much better. ACM is second only to FKM regarding its oil resistance and heat resistance, but its price is much lower. However, the water resistance and cold resistance of ACM are relatively poor, so the working conditions shall be taken into consideration when selecting ACM material.

9. Design of shaft and housing

9.1 Roughness and accuracy of shaft and housing

If the accuracy of the shaft or housing is insufficient, the bearing may not be able to adequately perform its normal functions. As an example, poor accuracy of the shoulders may cause misalignment of the bearing rings, which increases the moment load within the bearing, reducing fatigue life and potentially causing cage breakage or raceway overheating.

Generally, fine turning or fine boring of shafts and housings can provide sufficient accuracy, but when an application has higher requirements for noise and accuracy, a ground finish may be needed. When two or more bearings are assembled in the same housing, a "through-hole" housing bore is also recommended for improved accuracy.

The general shaft and housing accuracy classes and roughness recommendations can be seen in Table 9.1.

Table 9.1 Accuracy of shaft and housing

Items	Accuracy class of bearing	Class shaft	Housing bore
Roundness tolerance	Class 0 , Class 6	IT3/2—IT4/2	IT4/2—IT5/2
	Class 5 , Class 4	IT2/2—IT3/2	IT2/2—IT3/2
Cylindricity tolerance	Class 0 , Class 6	IT3/2—IT4/2	IT4/2—IT5/2
	Class 5 , Class 4	IT2/2—IT3/2	IT2/2—IT3/2
End face run-out of shoulders	Class 0 , Class 6	IT3	IT3—IT4
	Class 5 , Class 4	IT3	IT3
Roughness degree of matching surface(Ra)	Small size bearing	0.8	1.6
	Large bearing	1.6	3.2

Remark: please refer to the appendix for IT value of standard tolerance.

9.2 Mounting dimensions

Shoulder height(h) of shaft and housing should be larger than the maximum bearing chamfer(rsmax) and contact the flat portion of the bearing end face. The fillet radius(ra) should be smaller than the minimum bearing chamfer(rsmin) to not affect mounting. Table 9.2 shows the minimum recommended shoulder height. In situations where the bearing takes large axial loads, higher than minimum shoulder heights(h) will be required.

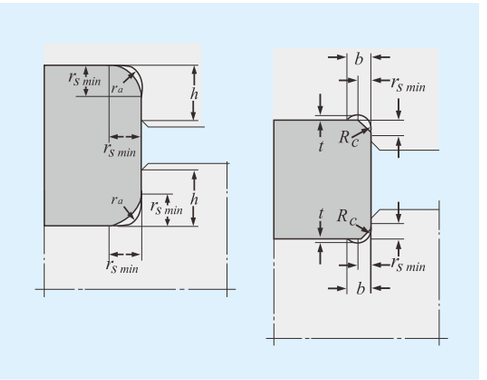
In order to decrease stress concentration and to increase shaft strength, the maximum fillet radius(Rmax) should be larger than bearing chamfer (Fig. 9.1 a). If the shoulder is too low to get sufficient contact area, a spacer is used between the bearing and shaft shoulder. (Fig. 9.1b)

The cutting allowance of ground finish for shaft and housing is shown in Table 9.3

Table 9.2 Shoulder height and fillet radius

Unit: mm

Chamfer dimension r_{smin}	Shoulder height h (Min)	Fillet radius R (Max)
0.1	0.4	0.1
0.15	0.6	0.15
0.2	0.8	0.2
0.3	1.25	0.3
0.6	2.5	0.6
1	3	1
1.1	3.5	1
1.5	4.25	1.5
2	5	2
2.1	6	2
2.5	6	2
3	7	2.5
4	9	3
5	11	4
6	14	5
7.5	18	6
9.5	22	8
12	27	10
15	32	12
19	38	15



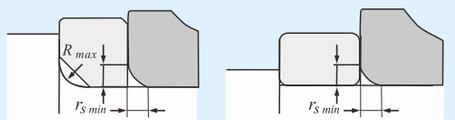


Fig. 9.1 Bearing mounting with spacers

Table 9.3 Grinding cutter relieving dimension

Unit: mm

Chamfer dimension r_{smin}	Cutter relieving dimension		
	b	t	R_c
1	2	0.2	1.3
1.1	2.4	0.3	1.5
1.5	3.2	0.4	2
2	4	0.5	2.5
2.1	4	0.5	2.5
2.5	4	0.5	2.5
3	4.7	0.5	3
4	5.9	0.5	4
5	7.4	0.6	5
6	8.6	0.6	6
7.5	10	0.6	7

9.3 Sealing device

Bearing seals are utilized to prevent dirt such as dust, moisture, metal powder etc. from entering. At the same time, it can prevent internal lubrication from leaking. Therefore, in certain applications seals are important to maintain longest life capabilities. Seals must not seize, lead to abnormal friction, or result in mounting or dismounting issues.

Seals can be classified into contact and non-contact types according to their structure.

9.3.1 Non-contact sealing

Non-contact seals have small clearance with the shaft. They have nearly zero friction and are suitable for high-speed rotation as they have small temperature rise and no abrasion.

The simplest form of non-contact sealing(Fig. 9.2) is to decrease clearance with the shaft. This kind of sealing is suitable for grease lubrication, and dry condition with little dust.

To make several concentric circle oil grooves in the bearing housing diameter is a way to improve sealing(Fig. 9.3). In grease lubrication, these grooves can hold grease keeping dirt out.

When using spiral oil lubrication on the horizontal shaft, if oil grooves are opposite to the direction of bearing rotation, the oil flowing out along the shaft will return to the bearing housing(Fig.9.4). Of course, spiral grooves on the outer diameter of shaft can have the same effect on sealing.

The so-called labyrinth sealing means multi labyrinth grooves is designed to prolong channels, improving the sealing effect. This type of sealing is used for grease lubrication. Filling lubricating grease into labyrinth grooves can prevent outside dust or moisture from entering the bearing.

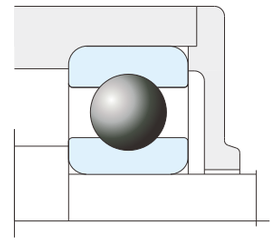


Fig. 9.2 Non-contact sealing

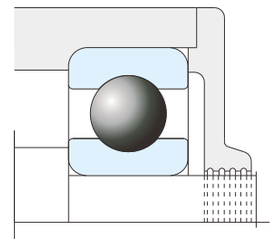


Fig. 9.3 Concentric oil groove sealing

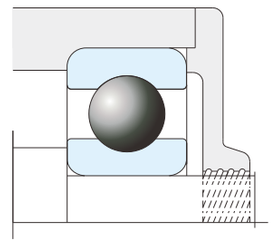


Fig. 9.4 Spiral oil groove sealing

9.3.2 Contact sealing

Contact sealing is achieved by means of contact between the shaft and the seal. Generally speaking, contact sealing has better effect than non-contact sealing, but its friction torque and temperature rise are higher.

Felt seals are the simplest way of sealing, which is mainly used for grease lubrication (Fig. 9.5) to prevent slight dust. However, it is very hard to stop oil from soaking and leaking through felt.

Oil seals are widely used and have become the most effective method of sealing, which have springs to control seal lip contact force. The directions of lips vary with the sealing purpose. If it is to prevent foreign matter from entering into bearings, the direction shall be outward (Fig.9.6a) while if it' s to prevent lubrication from flowing out, the direction shall be inward.(Fig.9.6 b)

Based on the application condition different seal lip material can be used. Table 9.4 shows temperature scope of all kinds of material in different working conditions.

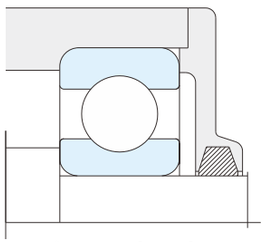


Fig. 9.5 Felt seals

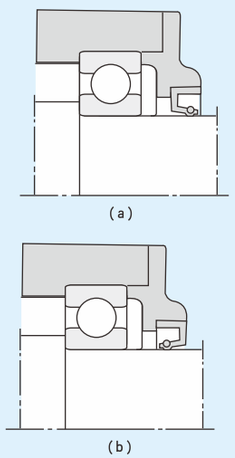


Fig. 9.6 Oil seals

Table 9.4 Sealing material and application temperature

Sealing material	Temperature scope °C
Nitrile-butadiene rubber	-25~ + 100
Methacrylate rubber	-15~ + 130
Silicone rubber	-70~ + 150
Fluoro-elastomer	-30~ + 180
Tetrafluoro ethylene resin	-50~ + 220
Felt	-40~ + 120

Allowable speed of contact type seal varies according to smoothness, accuracy class, lubrication, and application temperature etc. See Table 9.5 for details.

Table 9.5 Seal type and allowable velocity

Seal Type	Allowable linear velocity m/s
Felt seals	4
Grease seal	6
Oil-seal (nitrile-butadiene rubber)	15
Oil-seal (fluoro-elastomer)	32

Table 9.6 shows reference figure of contacting section roughness between shaft and sealing lip. In order to improve abrasion resistance, the hardness of shaft surface must reach HRC 40 via heat treatment and solid chroming. If possible HRC 55 or more is more preferred.

Table 9.6

Linear velocity m/s		Surface roughness μm
over	up to	Ra
—	5	0.8
5	10	0.4
10	—	0.2

10. Rotation speed limit of bearings

Bearing rotational speed limit refers to the value when excessive heat will not be generated and the bearing can operate continuously.

Each rolling bearing has its specified rotation speed limit. When bearings rotate from lower speed to higher speed, the temperature inside generated by friction heat will rise. The speed limit varies with the difference of bearing structure, dimension, cage structure, material, load, lubrication method, and cooling conditions around the bearing.

The rotation speed limits under grease lubrication and oil lubrication is specified in the bearing specification table. These values are the allowable rotation speed when standard design bearings rotates under normal load conditions. Oil lubrication refers to oil bath lubrication.

Some lubricants have very good performance, but are not suitable for high speed rotation. So when bearing rotation speed exceeds the speed limit by 70 %, high-speed lubricating grease or lubricating oil must be chosen.

10.1 Correction of rotation speed limit

When bearing dynamic equivalent load exceeds 8% of basic dynamic load rating, or axial load exceeds 25% of radial load, the rotation speed limit should be corrected by multiplying the correction coefficient listed in Fig. 10.1 and 10.2. The following equation is used to get the correction rotation speed.

$$N_a = f_1 \cdot f_2 \cdot n$$

In the formula:

n_a: Limiting speed after correction, r/min

f_1 : Correction coefficient relevant to load condition (Fig.10.1)

f_2 : Correction coefficient relevant to combined load (Fig.10.2)

n : Speed limit, r/min (Refer to bearing specification table)

If bearing rotation speed goes over speed limit, sufficient research on bearing's degree of precision, internal clearance, cage structure and material shall be done, and also proper lubrication method shall be adopted, including forced circulatory lubrication, spray lubrication, mist lubrication or oil air lubrication and so on.

The rotation speed limit can be improved by adopting above methods. The value can be calculated by multiplying oil lubrication rotation value in bearing dimension table with the correction coefficient in Table 10.1.

Table 10.1 Rotation speed limit correction determined under high speed

Bearing type	Correction value
Cylindrical roller bearing (single row)	2
Needle roller bearing (excluding large width)	2
Tapered roller bearing	2
Spherical roller bearing	1.5
Deep groove ball bearing	2.5
Radial-thrust ball bearing (excluding matched bearing)	1.5

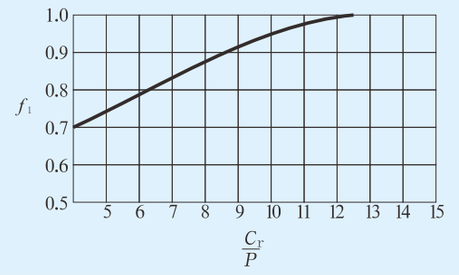


Fig. 10.1 Values of correction coefficient of load condition f_1

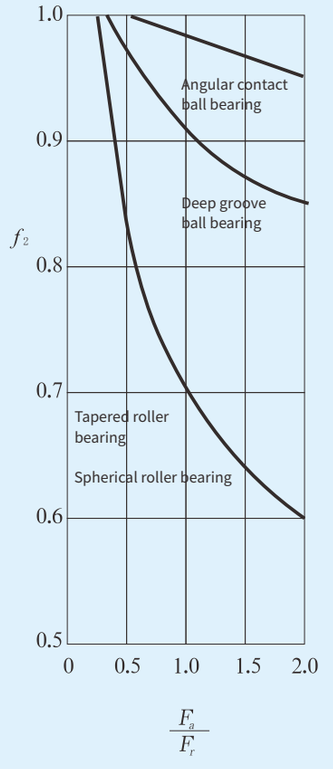


Fig. 10.2 Values of correction coefficient of combined load f_2

10.2 Rotation speed limit of sealed ball bearings

The speed limit of ball bearings with contact seals is reduced relative to open or shielded bearings. The reduction is a function of the rubber seal material.

10.3 Considerations for high-speed rotation

When bearings operate at high speeds, especially at speeds approaching or exceeding the bearing limiting speed, the following items should be considered:

1) use of a higher precision bearing
2) evaluation of the bearing internal clearance (consider potential clearance effects cause by temperature increase)
3) evaluation of the cage material (for very high speeds, bronze or phenolic resin machined cages, or molded synthetic resin cages, might be considered)
4) evaluation of the lubrication method (such as forced oil recirculation, spray lubrication, oil mist, and oil air lubrication)

10.4 Friction coefficient of bearings (for reference)

In order to make it easy to compare between bearing types, including plain bearings, friction torque of rolling bearings can be calculated as a function of the bearing bore diameter using the following formula:

$M=\mu Pd/2$

In the formula:

M: Friction torque, N•m
μ: Friction coefficient, see Table 10.2
P: Bearing load, N
d: Nominal bore diameter, mm

Friction coefficient is influenced greatly by bearing type, bearing load, rotation speed, lubrication method etc. In general situations, the reference values of friction coefficient under rotation are shown in Table 10.2.

The friction coefficient for most plain bearings is typically in the range of 0.01 to 0.02, but can be as high as 0.20 for some designs.

Table 10.2 Friction coefficient μ of various bearing types

Bearing type	Friction coefficient μ
Deep groove ball bearing	0.0010~0.0015
Angular contact ball bearing	0.0012~0.0020
Sell-aligning ball bearing	0.0008~0.0012
Cylindrical roller bearing	0.001~0.015
Full complement needle roller bearing	0.0025~0.0035
Needle roller bearing with cage assembly	0.0020~0.0030
Tapered roller bearing	0.0017~0.0025
Spherical roller bearing	0.0020~0.0025
Thrust ball bearing	0.0010~0.0015
Thrust spherical roller bearing	0.0020~0.0025

11. Load rating and bearing life

11.1 Static load rating

The static load rating C_0 is used for life calculations under the following conditions:

- Low speed (n<10 rpm)
- Slow oscillating motion
- Long period of time with no rotation while subjected to load

For bearings in rotation or at rest, relevant safety factor should also be checked for short-term load, including impact load or maximum load.

The basic static load rating conforms to GB/T standard 4662, considering the contact stress calculated at the center of the contact between the most heavily loaded rolling element and the raceway:

- 4600MPa for spherical ball bearing
- 4200MPa for all other ball bearing
- 4000MPa for all the roller bearing

The above stress limits are the amounts which would result in permanent deformation of the raceway of 0.0001 times the rolling element diameter. For radial bearings, the value is based on a pure radial load. For thrust bearings, the value is based on an axial load acting along the centerline of the bearing.

The static load safety factor is defined as:

$S_0=C_0/P_0$

In the formula:

C_0——Basic static load rating, kN
P_0 ——Static Equivalent load, kN
S_0 ——Static load safety factor

11.2 Dynamic load rating and service life

The basic dynamic load rating C, is used to calculate bearing life under dynamic stress, i.e. rotating while under load. The magnitude and direction of load are assumed to be constant, but adjustments to the calculation can be made for varying loading conditions.

The basic dynamic load rating is calculated according to standard GB/T 6391, and is based on bearing ring hardness of 58 HRC minimum.

11.2.1 Life of rolling bearings

The life of a rolling bearing is defined as the total number of revolutions the bearing can reach or the total number of working hours at a certain speed before the first signs of metal fatigue (spalling or fracture) occurs on either bearing ring or rolling body. All information for basic dynamic load rating is based on a sufficient number of identical or similar bearings among which 90% can reach or exceed the service life.

11.2.2 Basic rated life

According to GB/T 6391, the basic rated life of bearings is

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

If the rotational speed is fixed, the life of the bearing is usually expressed in working hours, and the formula is:

$$L_{10h}=\frac{10^6}{60n}\left(\frac{C}{P}\right)^{\varepsilon}$$

In the formula:

L_{10}- Basic rated life (90% reliability), million rotations
L_{10h}-Basic rated life (90% reliability), hour
C- Basic dynamic load rating, kN
P- Dynamic equivalent bearing load, kN
n-Rotation speed
ε-Life coefficient
Ball bearing ε=3
Roller bearing ε=10/3

As to bearings applied to automotive wheel hubs, its basic rated life can be expressed by miles:

$$L_{10k}=\pi D\left(\frac{C}{P}\right)^{\varepsilon} \text{ or } L_{10k}=\pi D L_{10}$$

In the formula:

L_{10k}: Basic rated life km
D: Wheel diameter mm

For bearings used in oscillating motion applications, with an angle of movement of ±γ°, then:

$$L_{10osc}=\frac{180}{2\gamma}L_{10}$$

In the formula:

L_{10osc}: Basic rated life (millions of oscillations)
γ: Amplitude(degree)

When amplitude is small, there is no need to calculate basic rated life.

In order to simplify the calculation, we take 500h as the standard of rated life, and introduce speed coefficient f_n and life coefficient f_h.

$$f_n=\left[\frac{33\frac{1}{3}}{n}\right]^{\frac{1}{\varepsilon}}$$

$$f_h=\left[\frac{L_{10k}}{500}\right]^{\frac{1}{\varepsilon}}$$

Then, the required capacity to achieve sufficient life becomes:

$$C=\frac{f_h}{f_n}P$$

The value of f_h and f_n can be obtained from Fig. 11.1 according to the rotation speed and the expected service life L_{10h}, and then the basic dynamic load rating of the targeted bearing can be easily determined.

11.2.3 Service life of bearing

When selecting the proper bearing, the required service life needs to be considered, depending on the machine type, operating conditions, and required reliability. Recommended values for bearing service life for various kinds of machines and conditions are shown in Table 11.1.

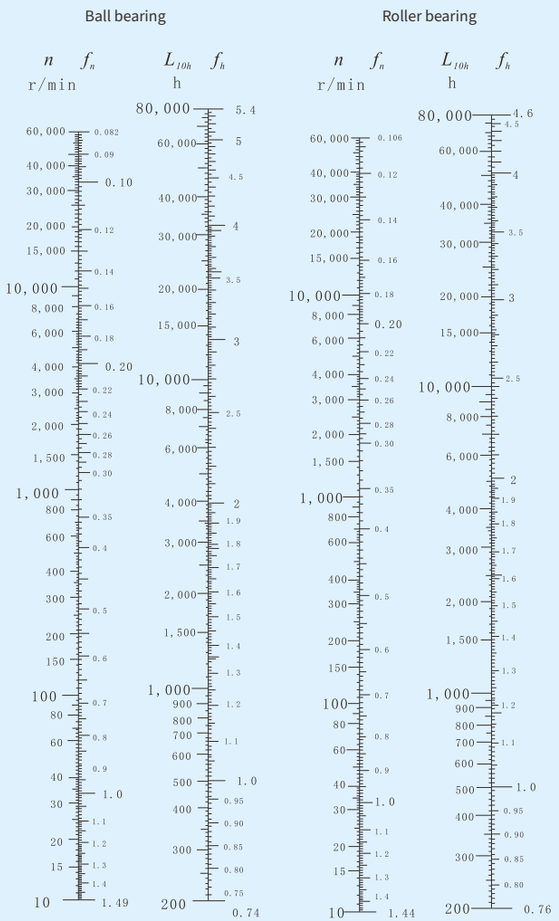


Fig. 11.1 Fatigue life coefficient

Table 11.1 Recommended values of bearing service life required by different kinds of machinery

Conditions	Service life (h)
- Seldom utilized instrument and equipment	300~3000
- Intermittently utilized machinery whose failure will not cause critical issues, such as manual machinery, agricultural equipment, heavy cargo hoisting equipment crane, automatic feeding device	3000~8000
- Intermittently utilized machinery whose failure will cause critical issues, such as power station equipment, conveyors, belt-type transportation machines, cranes, workshop cranes	8000~12000
- Equipment seeing regular operation (8 hrs/day) but not always fully loaded, such as electric motors, gear devices, crushers, cranes and ordinary machinery	10000~25000
- Equipment seeing regular operation (8 hrs/day) but not always fully loaded, such as electric motors, gear devices, crushers, cranes and ordinary machinery	20000~30000
- Equipment running 24 hours/day, such as compressors, pumps, electric motors, rolling mill gear devices, and textile machinery	40000~50000
- Equipment running 24 hrs/day, with no failures allowed, such as fiber machinery, paper manufacturing machinery, major equipment of power stations, water supply facilities drainage plant, mine pump, and mine water discharge facilities	≈100000

11.2.4 Calculations of dynamic equivalent load

When bearing works under constant load in constant direction, its dynamic equivalent load can be calculated according to the formula below:

$$P=X F_r +Y F_a$$

In the formula:

P: Dynamic equivalent load, N

F_r: Radial load, N

F_a: Axial load, N

X: Radial dynamic load coefficient

Y: Axial dynamic load coefficient

For dynamic equivalent load calculation and the specific value of radial dynamic load coefficient and axial dynamic load coefficient, please refer to specification table of all types of bearings.

When bearing takes constant torque load, dynamic equivalent load can be calculated according to the formula below:

$$P_m= f_m P$$

In the formula:

P_m : Dynamic equivalent load with torque load N considered

f_m: See Table 11.2 for torque load coefficient

When a bearing sees impact loading, the dynamic equivalent load needs to be adjusted according to the formula below:

$$P_d=f_d P$$

In the equations:

P_d: Dynamic equivalent load (N) with impact load considered

f_d: Impact load coefficient, see Table 11.3

Table 11.2 Torque load coefficient f_m

Load condition	f_m
Torque load (smaller)	1.5
Torque load (larger)	2

Table 11.3 f_d value

Loading type	f_d	Example
No impact or slight impact	1.0~1.2	Electric motor, steam turbine, ventilator
Medium impact load	1. 2~1.8	Vehicle, machine tool, crane, metallurgical equipment, internal combustion engine
Strong impact	1. 8~3.0	Crusher, rolling mill, petroleum drill, vibration screen

If bearing works under variable load and speed, mean dynamic equivalent load and mean rotation speed should be used to calculate bearing service life. Normally mean dynamic equivalent load should be calculated according to the equation below:

$$P_m = \sqrt[3]{\frac{1}{N}\int_0^N P^3 dN}$$

In the formula:

P_m: Mean dynamic equivalent load, N

P: Dynamic equivalent load, N (functional equations)

N: Total revolutions (r) within one period of load variation

For the relationship between load and rotation speed as show in Figure 11.2, the equation of mean dynamic equivalent load should be:

$$P_m = \sqrt[3]{\frac{N_1 P_1^3 + N_2 P_2^3 + N_3 P_3^3 + \cdots}{N}}$$

When bearing's rotation speed remains constant and the load varies continuously and periodically with time changes, the mean dynamic equivalent load could be determined by a simplified formula. See Fig. 11.3 for example.

If bearing load is composed of load F_1(e.g. rotor weight) whose magnitude and direction are both constant and rotation load F_2 whose magnitude is unaltered (e.g. centrifugal force caused by imbalance) (See Figure 11.4), its mean load F_m can be calculated through the following equation:

$$F_m = \varphi_m = \vec{F}_1 + \vec{F}_2$$

In the formula:

Φ_m coefficient can be determined in accordance with Fig. 11.5. After F_m is determined, we can change F_m into mean dynamic equivalent load P_m according to the plane direction of combined load by F_1 and F_2.

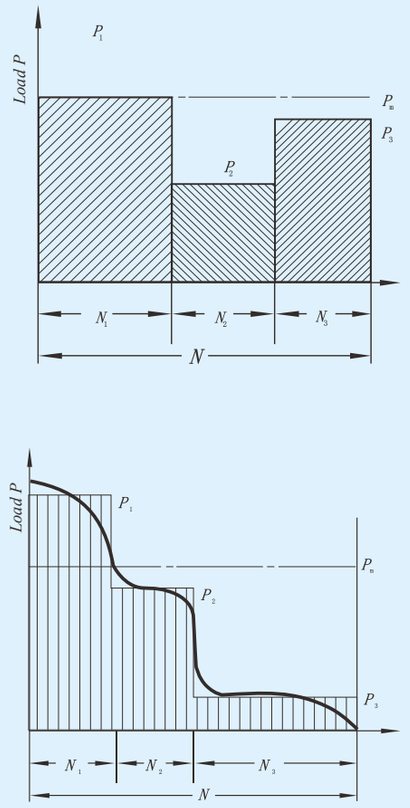


Fig. 11.2 Relations between bearing load and rotation speed

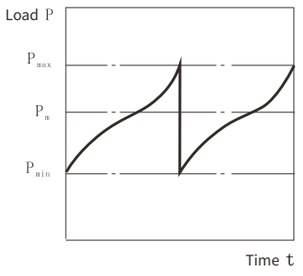
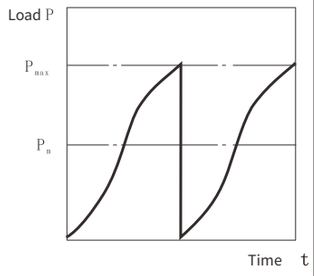
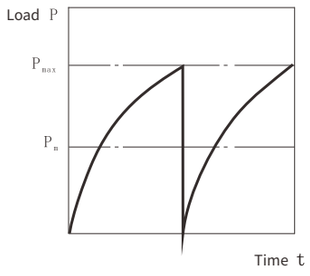
Normal curve	Sine curve	Upper half of sine curve
		
$P_m = \frac{1}{3}(P_{min} + 2P_{max})$	$P_m = 0.65P_{max}$	$P_m = 0.75P_{max}$

Fig. 11.3

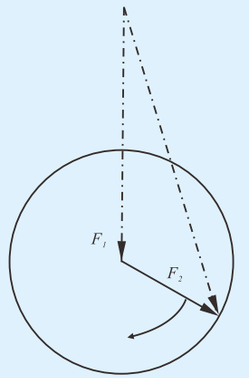


Fig. 11.4 bearing load composed of F_1 and F_2.

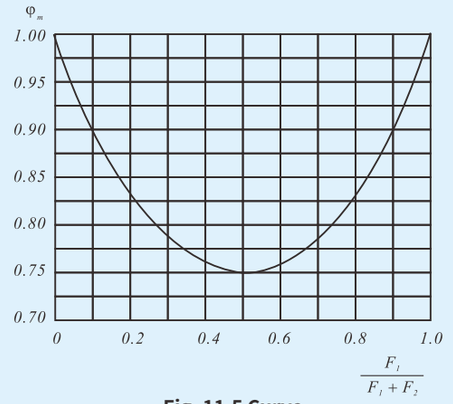


Fig. 11.5 Curve

11.2.5 Main factors that influence bearing's dynamic load capacity

The calculation method for basic dynamic load rating is applicable to bearings made with high quality steel (i.e. high quality vacuum degassed steel) and high quality manufacturing processes. Dynamic load ratings in the catalog also assume standard raceway surface profiles. Bearing dynamic load capacities can be affected by the following:

● Materials

The magnitude, distribution, and content of inclusions in materials varies due to different smelting methods. The difference in materials can result in either a positive or negative effect on the bearing's load capacity. The basic dynamic load ratings listed in this catalog are all based on vacuum degassed bearing steel. The dynamic capacity is lower if electric furnace bearing steel is used. On the other hand, certain special steel manufacturing (i.e. vacuum remelting, electros lag remelting, etc.) can be used to increase bearing capacity.

● Temperature

The operating temperatures for standard bearings can reach 120°C without need for modifications. When operating temperatures exceed this limit for any extended periods of time, special heat treatment or materials may be needed. If bearings operate above 120°C for an extended period, or extremely high temperatures for even a short time, the bearing material microstructure will change, resulting in a decrease in load capacity. This effect can be described below:

$C_T = g_T C$

In the equation:

C_T :basic load rating N after thermometric correction

g_T : temperature coefficient, please refer to value in Table 11.4

● Hardness

Typical surface hardnesses of bearing parts are 60-65 HRC. However, in some cases the actual hardness is lower than this range, such as when bearing rings receive higher tempering in order to operate in higher temperature environments. If the surface hardness falls below 58 HRC, dynamic capacity is adjusted downward accordingly. This relationship is as follows:

$C_H = g_H C$

$g_H = (HRC/58)^{3.6}$

In the equation: .

C_H: basic dynamic load rating N after material hardness correction

g_H : hardness coefficient

Table 11.4 g_T value

Working temperature/ °C	<120	125	150	175	200	225	250	300
g_T	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.60

11.2.6 Adjusted rating life

It is typical to use the basic rating life L_{10} as the general standard for assessing bearing life. L_{10} life represents 90% reliability, and also assumes commonly used materials and processing quality. However, in many occasions, varying degrees of reliability need to be considered, or there may be special bearing performance requirements, or unusual operating conditions may be present. In such cases, the formula below can be utilized to calculate a corrected basic rating life:

$$L_{na}=\alpha_1\alpha_2\,\alpha_3\,L_{10}$$

In the equation:

L_{na}: corrected rating life under special bearing properties and running condition, and degree of reliability is 100-n (million revolutions).

α_1: correction coefficient for reliability

α_2: life correction coefficient for special bearing properties

α_3: correction coefficient for special operating conditions

● Correction coefficient α_1 for reliability

Generally, 90% reliability is used to assess bearing's fatigue life, where α_1 =1; yet in some occasions, it is required that the degree of reliability is higher than 90% and α_1 coefficient can be chosen by referring to Table 11.5.

● Correction coefficient α_2 for special bearing properties

When special materials, special processing, or specific design improvements are utilized, coefficient a_2 can reflect the corresponding influences on life.

When adopting steel products with very low inclusions or special treatment, $\alpha_2 \geqslant 1$ is acceptable. If special heat treatment brings about the decrease of material hardness, which result in the drop of bearing life, correspondingly reduced α_2 value shall be adopted. When choosing α_2 value, consideration shall be made whether the special design is needed to improve or degrade contact stress uniformity between rolling element and raceway groove.

Value α_2 cannot be greater than 1 if special material, technique or design is adopted whereas lubrication is poor.

● Correction coefficient α_3 for special operating conditions

The α_3 factor includes the effect of lubrication conditions (adequacy under operating speed and temperature), contamination entry, and special situations that might cause a change in material performance (i.e. excessive temperatures). Under normal operating conditions, correct bearing mounting, adequate lubrication, protection against contamination entry, and avoidance of excessive temperatures, the value of α_3 can be 1 if the rolling contact surfaces are adequately separated by the lubricating oil film. When the lubricating condition is ideal enough to form an elastic fluid pressure oil film at the rolling contact surface and thereby significantly decrease the probability of fatigue damage caused by surface failure, the value of α_3 can be above 1.

When the lubrication is so poor that the dynamic viscosity of lubricant under working temperature is less than 13 mm^2/s for ball bearing, and less than 20 mm^2/s for roller bearing, or rotation speed is in particularly low ($n \cdot D_{PW}$ <10000; "n" stands for rotation speed, D_{PW} for pitch circle diameter of rolling group), value α_3 can be below 1.

Table 11.5 α_1 value

Degree of reliability(%)	90	95	96	97	98	99
α_1	1	0.62	0.53	0.44	0.33	0.21

11.3 Bearing dimension selection based on static load rating

Under the conditions listed below, the bearing size should be determined based on the static load rating:

1) Bearing supports continuous loading or an impact load under very low speed conditions (less than 10r/min)

2) Bearing oscillates slowly under load

3) Bearing sees relatively large impact loading during operation

11.3.1 Static equivalent load of bearings

The radial/axial static equivalent load is the radial/axial load that has equivalent contact stress to actual loading condition which is generated at the contact center between the raceway and the rolling element that takes the largest load.

11.3.2 Determine the static load rating required for bearings

The basic formula for selecting bearings according to static load rating should be:

$$C_0 = S_0 P_0$$

In the equation:

C_0 : static load rating, N

P_0 : static equivalent load, N

S_0: safety coefficient

If the surface hardness of the bearing is decreased due to special heat treatment or high temperature exposure, its static load capacity will be reduced. The influence that material hardness has upon the static load rating of the bearing can be calculated by the equation below:

$$C_{0H} = \eta_H C_0$$

$$\eta_H = f_H \left(\frac{HV}{800}\right)^2 \leq 1$$

In the equation:

C_{0H}: static load rating N after correction of material hardness

ηH : hardness coefficient

f_H: cofficient related to contact type, see Table 11.6

HV: vickers hardness value

Table 11.6 f_H value

Contact type	f_H
Ball and surface contact (self-aligning ball bearing)	1
Ball and raceway groove contact	1.5
Roller and roller contact (radial roller bearing)	2
Roller and surface contact	2.5

11.3.3 Calculation method for static equivalent load

1) Static equivalent load of radial bearings is calculated according to the following equation:

α=0° radial roller bearing which only takes radial load:

$$P_{0r} = F_r$$

Radial ball bearing and α ≠0° radial roller bearing:

Adopt the relatively larger value calculated by the two equations

$$P_{0r} = X_0 F_r + Y_0 F_a \text{ and } P_{0r} = F_r$$

In the equation:

X_0 : static radial load coefficient

Y_0 : static axial load coefficient

For values X_0 and Y_0 of all kinds of bearings, please refer to dimension and performance table.

2) Axial static equivalent load for thrust bearings is calculated according to the following equation:

α =90° thrust bearing

$$P_{0a} = F_a$$

α ≠90° thrust bearing

$$P_{0a} = 2.3 F_r \operatorname{tg}\alpha + F_a$$

11.4 The selection of safety coefficient S_0

● Stationary bearing

For stationary bearings as well as bearings which oscillate or rotate very slowly, a safety coefficient S_0 can be utilized based on Table 11.7.

● Rotating bearing

For some bearings with large load variation, especially for swivel bearings suffering major impact load in operation, the bearing size shall be verified in reference to the static load rating after it was selected according to dynamic load rating.

If the rotation speed of the bearing is low, and the requirements for running precision and running torque are not high, relatively large contact stress can be allowed and a value of S_0<1 can be used. Otherwise, an S_0>1 should be used.

For thrust spherical roller bearings, whether it rotates or not, $S_0 \geqslant 4$ is chosen.

In addition, when selecting a bearing according to static load rating, the rigidity of the assembly is an important consideration. When rigidity of the bearing housing is relatively low, a higher safety coefficient is needed.

Table 11.7 Safety coefficient S_0 for static bearing

Bearing's application	S_0
Plane laminae of variable pitch propeller	⩾0.50
Dam sluice gate device	⩾1
Suspension bridge	⩾1.5
Heavy crane hook with small dynamic load	⩾1
Minitype handing crane hook crampon with large dynamic load	⩾1.6

Table 11.8 Safety coefficient S_0 for rotating bearings

Application requirement or load characteristic	S_0	
	Ball bearing	Roller bearing
High requirement for running accuracy and smoothness, or with impact load	1.5~2	2.5~4
Normal use	0.5~2	1~3.5
Low requirement for running accuracy and smoothness, without impact and vibration	0.5~2	1~3

12. Bearing handling

12.1 Precautions

As the rolling bearing is a precise component, it shall be handled carefully according to relevant steps and specifications during mounting and dismounting, preferably with proper tools. It should be avoided to have any heavy impacts to the bearing or apply loads to the rolling elements. The mounting environment has to be clean and materials like cloth and fibre are not allowed to clean the bearing because these will influence the service life of bearings and performance characteristic. Improper mounting may result in premature failure of bearings.

1) Maintain bearings and working environment clean

Even small dust that is invisible could bring harmful effect on bearings. Therefore, the working environment must be kept clean to ensure that no dust gets into bearings.

2) Proper mounting

Strong impact could cause dents in bearing. On severe occasions, bearing may have cracks or fractures, which are often the reason for accidents. Therefore, proper mounting tools must be used to avoid damage to bearing.

3) To avoid corrosion of bearing

During mounting perspiration from hands could result in rust. Thus it is advisable that workers put on gloves when working with bearings.

12.2 Storage

When shipping, all bearings are coated with certain amount of anti-corrosion oil and wrapped in anti-tarnish paper. As long as the packaging is undamaged, its quality could be guaranteed. Yet during long-term storage, it is recommended that bearing should be shelved 30cm above the ground in locations where humidity is below 65% and temperature is around 20°C. Furthermore, avoid storage in places exposed directly to sun light or placing bearing boxes against cold walls. If packed in good condition, the bearing can be stored for several years in proper conditions.

12.3 Bearing mounting

Proper mounting has direct influence on the precision, life and performance of bearings. Therefore, design and assembly department should conduct adequate research on bearing mounting. The bearing should be mounted according to proper operation standard. The process flow can be as follows:

1) Clean up bearing and relevant components
2) Check dimension and precision of relevant components
3) Mounting operation
4) Inspection after mounting
5) Replenishment of lubricants

The packaging of bearing should only be removed immediately before mounting. Ordinary grease lubrication bearing and oil lubrication bearing do not need cleaning. However, for instrument use or high speed application, anti-corrosion oil needs to be removed using a clean detergent oil. After the removal of the anti-corrosion oil, bearings should not be left for a long time because they rust easily. Yet shielded/sealed bearing can be used directly without cleaning.

The mounting method of a bearing varies with bearing structure, fitting and working conditions. If the shaft rotates, the inner ring should have an interference fit. For bearing with cylindrical bore, press tool for mounting or expand bearing by heating are preferred. Bearing with tapered bore is mounted directly on tapering shaft or use sleeves for mounting. Clearance fit is often applied to the housing. For bearings in which the outer rings is interference fit, press tool is used for mounting or shrink fit method is applied. Anti-corrosion measure should be taken in situations where ice is used as coolant in shrink fit method because the moisture in the atmosphere adheres to bearings.

12.3.1 Mounting of bearing with cylindrical bore

● Press fitting

Small bearings can be mounted by a mounting tool placed on the inner ring as shown is Fig. 12.1. After the spacer is placed on end face of inner ring, bearing is slowly pressed on the shaft until the side of the inner ring rests against the shoulder of the shaft. The mounting tool must not be placed on the outer ring for press mounting, since the bearing maybe damaged.

Before mounting, applying oil to the fitting surface is recommended. The mounting method using a hammer should only be used by adding spacers on the inner ring. However this method causes bearing damage easily, so it is only applicable to bearing with small interference instead of medium and large bearings with large interference.

When both inner ring and outer ring of non-separable bearings (such as deep groove ball bearing) require interference fit, a mounting spacer should be placed on both rings as shown in Fig. 12.2. Since the outer ring of self-aligning ball bearings are prone to deflect, a mounting tool should always be used for mounting them.

In the case of separable bearings (such as cylindrical roller bearings and tapered roller bearings) the inner ring and outer ring maybe mounted separately, and then alignment of both parts should be done carefully, or forced assembly may cause scratches on the rolling contact surface.

● Shrink fitting

Since press fitting for large bearings requires a large force, shrink fitting is widely used. The bearings are first heated in oil tank or oven to expand them before mounting. This method prevents an excessive force from being imposed on the bearings and allows mounting in a short time. The heating temperature of bearings are determined by size, interference required for mounting etc. The precautions are as follows: generally the heating temperature does not exceed 100°C, i.e. 80°C~90°C is good; seals deformation, second tempering and grease leakage will happen if the temperature is too high.

When heating bearing, it is preferred to use metal nets or a lifting device and 20°C to 30°C higher than the lowest temperature required for mounting to prevent inner rings from being cooled and hard to mount. After mounting, the bearings will shrink in the width direction while cooling, so shaft nut or other locating methods should be used to fix the inner ring and shaft shoulder tightly.

Besides heating in oil, electromagnetic induction or oven heating are widely used.

For electromagnetic induction heaters, electricity in a coil produces a magnetic field that induces a current inside the bearing that generates heat. Consequently, heating evenly in a short time is possible, making bearing shrink fitting efficient and clean.

In the case of relatively frequent mounting and dismounting such as cylindrical roller bearings for roll necks of rolling mills and for railway journal boxes, induction heating should be used for mounting and dismounting inner rings.

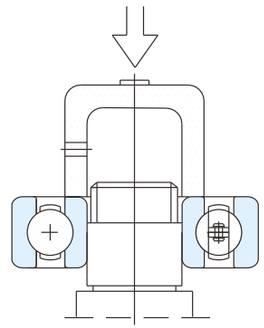


Fig. 12.1 Force mounting of inner ring

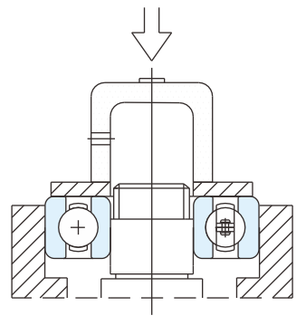


Fig.12.2 Force mounting of both inner and outer ring

12.3.2 Mounting bearings with tapered bore

Bearings with tapered bores are mounted on the tapered shaft and on cylindrical shaft with adapters and withdrawal sleeves, as shown in Figure 12.3, 12.4.

Large spherical roller bearings are mostly mounted by using hydraulic pressure. Spherical roller bearings should be mounted while checking their clearance reduction. When a large bearing is mounted on a shaft, the outer ring may be deformed into an oval shape by its own weight. If the clearance is the lowest part of the deformed bearing, the clearance value measured may be bigger than the true value. If an incorrect radial internal clearance is obtained in this manner and the value is used, then the interference fit may become too tight and the true residual clearance may become too small.

When a self-aligning ball bearing is mounted on a shaft with an adapter, be sure that the residual clearance does not become too small. Sufficient clearance for easy alignment of the outer ring must be allowed.

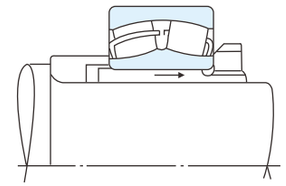


Fig. 12.3 Mounting with adapter

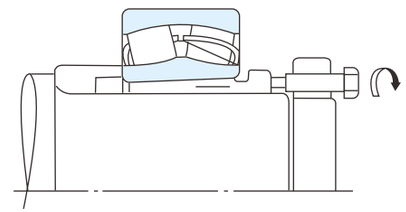


Fig. 12.4 Mounting with withdrawal sleeve

12.4 Operation inspection

After the mounting has been completed, a running test should be conducted to determine if the bearing has been mounted correctly. Small machines may be manually operated to assure that they rotate smoothly. Items to be checked include unfavorable running caused by foreign matter, visible flaws, indentation, and overlarge rotation torque caused by improper mounting or an improper mounting surface. If there are no abnormalities, load-up operation may be started.

Large machines which cannot be turned by hand shall conduct inertial rotation upon immediate stop of power after no-load rotation, and then we can confirm if there is abnormal vibration before going to power operation.

Powered operation starts from low speed and no load, and then gradually increase the speed, load, etc. to their normal levels. Items to be checked during the test operation include the existence of abnormal noise, excessive rise of bearing temperature, leakage and contamination of lubricants, etc. If any abnormality is found during the test operation, it must be stopped immediately and the machine should be inspected. If necessary, the bearing should be dismounted for examination.

Although the bearing temperature can generally be estimated by the temperature of the outside surface of the housing, it is more desirable to directly measure the temperature of outer ring using oil holes for access.

The bearing temperature should rise gradually to the steady state level within one to two hours after the operation starts. If the bearing or its mounting is improper, the bearing temperature may increase rapidly and become abnormally high. The cause of this abnormal temperature may be an excessive amount of lubricant, insufficient bearing clearance, incorrect mounting, or excessive friction of the seals.

The sound of a bearing may be checked with a noise locator or other instrument. Abnormal conditions are indicated by loud metallic sound, or other irregular noise, and the possible cause may include incorrect lubrication, poor alignment of the shaft and housing, or the entry of foreign matter into the bearing. The possible causes and countermeasures for irregularities are listed in Table 12.1 .

12.5 Bearing dismounting

A bearing may be removed for periodic inspection or periodic change. If the removed bearing is to be used again or it is removed only for inspection, it should be dismounted as carefully as when it was mounted. If the bearing has an interference fit, its removal may be more difficult. The tool for removal should be designed according to actual needs. The dismounting method, dismounting sequence, mounting fit shall be studied through drawing in order to protect the bearing from damage.

12.5.1 Dismounting of bearings with cylindrical bores

For small bearings pressing force as shown in Fig 12.5 or withdrawal force as shown in Fig 12.6 is often used. The efficiency to dismount is high and there is no damage to the bearings.

To make it convenient for withdrawal operation (see Fig 12.7 and Fig 12.8), it is advisable to cut grooves in the shoulder to accommodate the withdrawal tools.

For large bearings mounted with stationary fit, a heavy withdrawal force will be used to dismount since there is friction on the surface after a long term operation. Induction heating is also used to dismount bearings frequently of this type as the efficiency is higher.

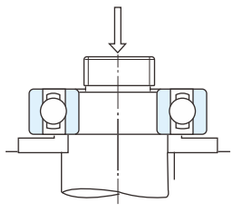


Fig. 12.5 Removal of inner ring using press machine

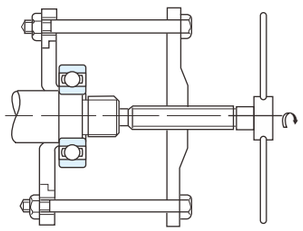


Fig. 12.6 Removal of inner ring using withdrawal tools

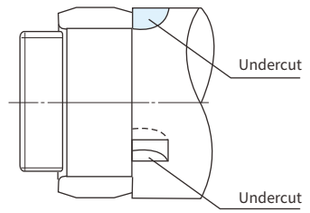


Fig. 12.7 Cut grooves for withdrawal force

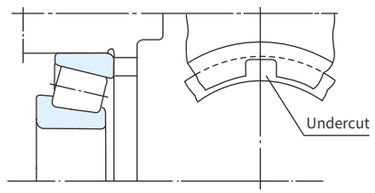


Fig. 12.8 Cut grooves for dismounting outer ring

Table 12.1 Reasons and countermeasures for abnormality of bearings

Running state	Reasons detected	Countermeasure
Abnormal sound	Abnormal load	Modify fitting and bearing clearance, modulate preload quantity, amend position of bearing shoulder
	Improper mounting	Processing precision of axle and housing, improve accuracy and method of mounting
	Unsuitable lubricant	Supply lubricant, select proper lubricant
	Contact by rotating parts	Avoid any contact with rotating parts
	Rolling surface generate indentation, rust and scar due to impurity	Replace bearing, clean relevant accessory, improve sealing device, and use pure lubricant
	Surface deformation (after steel carbonizing)	Replace bearing
	Raceway fracture	Replace bearing
	Excessive clearance	Study fitting and bearing internal clearance, modify preload amount
	Contaminant intrusion	Replace bearing, clean relevant accessory, improve sealing device, and use clean lubricating oil
	Ball damage, fracture	Replace bearing
Abnormal temperature rise	Too much lubricating grease	Remove excess grease and run the bearing again
	Insufficiency or unsuitable lubricating grease	Add lubricating grease, select appropriate lubricating grease
	Abnormal load	Modify fitting, study bearing clearance, adjust preload, and modify position of bearing shoulder
	Improper mounting	Improve precision of axle and housing, improve accuracy and method of mounting
	Creep of fitting surface and excess friction of sealing device	Replace bearing, study fitting, modify axle and housing. change seal type
Large vibration (axle runout)	Surface deformation (after steel carbonizing)	Replace bearing, operate properly
	Fracture	Replace bearing
	Improper mounting	Improve precision of bearing housing and amend method of mounting
	Contaminant intrusion	Replace bearing, clean relevant accessories, improve sealing device
Large grease purge, heavy discoloration	Too much grease in the bearing or contamination in grease	Use right amount of lubricant, change selection of lubricants or change bearing
Accelerate or decelerate (start or stop)	Mechanical resonance	Improve rigidity of shaft

Remarks:
For medium & large- sized cylindrical roller bearing and ball bearing with grease lubrication, especally under low temperature environment, there will be abnormal rolling sound. Normally, the temperature of bearing will not rise even rolling sound occurs, which will not influence its fatigue life and lubricating life duration and the bearing can be used as usual.

12.5.2 Dismounting of bearings with tapered bore

When dismounting relatively small bearings with adapter sleeves, a circular stop is used to support the end face of the inner ring after loosening the fastening nut, and then a hammer is used to dismount bearing as shown in Fig 12.9. For bearing installed with a withdrawal sleeve, dismounting can be achieved by tightening the nut and removing the withdrawal sleeve as shown in Fig 12.10.

Bearings mounted directly on a tapered shaft or large bearings with adapter sleeves or withdrawal sleeves may be dismounted easily by using oil pressure. Fig 12.11 illustrates the dismounting of a bearing mounted on a tapered shaft by forcing oil pressure on the fitting surface.

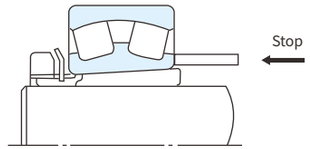


Fig. 12.9 Dismounting bearings with adapter

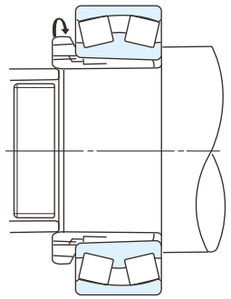


Fig. 12.10 Removal of withdrawal sleeve

12.6 Maintenance of bearings

Periodic maintenance and inspection should be performed to prolong good bearing performance.

Maintenance should be conducted periodically according to the operation standard of corresponding machinery. The scope of maintenance includes monitoring operation conditions, add or change the lubricants, regular dismounting and inspection. If an irregularity is found during operation, the cause should be determined and proper corrective actions should be taken. If necessary, the bearing should be dismounted and examined in detail.

12.7 Methods of analyzing bearing failures

1) Noise checking

Since the detection of bearing abnormalities through noises requires ample experience, sufficient training must be given to inspectors. It is recommended to assign a specific person using vibration sensors or listening rods on housings for effective detecting of bearing noise.

2) Checking of operating temperature

This comparative identification method is only applicable to relatively stable operations. For detection, operating temperatures must be continuously recorded. If abnormalities occur in bearings, operating temperature not only increase but also change irregularly. It is recommended that this method be employed together with noise checking.

3) Lubricant checking

This method analyzes the oil to detect contaminants such as metal particles or other foreign matter in the lubricant. This method is recommended for inspection of bearings which cannot be checked by close visual inspection and large size bearings.

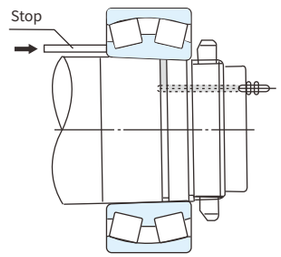


Fig. 12.11 Dismounting using oil pressure

13. Bearing failure analysis

In general, if rolling bearings are used correctly they will survive to their predicted fatigue life. However, they often fail prematurely due to various reasons. This premature failure is caused by improper mounting, using, or lubrication, entry of foreign matter, or inadequate understanding of fit and temperature effects, and sometimes these factors may exist simultaneously.

Bearing is a precise basic part of machinery. It is surely important that manufacturers supply high quality products that meet and satisfy the requirement of machinery. Yet it is even more important to use the bearing correctly. Although the quality inspection is conducted before mounting, premature failures such as rotating stuck, flaking on the rolling surfaces and cage wear or crack may occur after mounting. Numerous cases have exemplified that the premature failure is mostly caused by improper mounting and using rather than the bearing quality.

13.1 Bearing failure mechanisms

● Contact fatigue failure

Contact fatigue failure refers to the failure of bearing caused by the repeat contacts of alternate stress on its rolling surface. Contact fatigue flaking occurs on the rolling surface, and is often accompanied with fatigue cracks, which occurs at the point of maximum alternate stress beneath the contact surface and then reaches up to the surface with different forms, such as dotted flaking and sliced flaking. Along with the expanse of flaking, the flaking spread to the deeper of rolling surface and form deep flaking. Deep flaking is the source of contact fatigue failure.

● Wear failure

Wear failure refers to the continuous abrasion of a rolling surface caused by the relatively sliding friction between contact surfaces. Continuous abrasion will damage the bearing components which will ultimately result in the loss of dimensional precision, noise increase and other related problems. Abrasion is likely to cause the shape change, fit clearance increase and change of rolling surface. Besides, abrasion may also influence lubricant and make its contamination reach a certain level. Consequently, the bearing is deprived of its lubricating function completely or even the running accuracy, which makes the normal running impossible. Wear failure is the most frequent failure in all type of bearings, which include particle wear and adhesive wear.

Particle wear refers to the wear caused by foreign matters like solid particles or metal powder entering into the rolling surface and relative movement of contact surface. The abrasion often brings about furrow-like scratches on the bearing working surface. The foreign matter may come from within the machine in which bearings are mounted and other accessory component in the machine system via lubricating medium.

Adhesive wear refers to the asymmetric force on the friction surface caused by micro heave or impurities on the friction surface. When lubricating function severely fails, frictional heating on part of the surface will bring about deformation of friction surface and friction welding phenomenon on the friction surface. In severe cases, the surface metal may melt partly and the force on the contact surface will tear the local friction welding point from the matrix and increase the plastic deformation. This adhesion-tear-adhesion cycle process forms adhesive wear. Generally speaking, slight adhesive wear is called scratch, while severe adhesive wear is called seizure.

● Fracture failure

Bearing fractures are most commonly caused by material defects and over loading. The most common cause is a high impact load from events such as sudden machine failures and improper installation techniques. Fracture caused by defects such as tiny crack of bearing , shrinkage, bubble, big foreign matter, overheated structure as well as partial burn etc. is called defects fracture. Therefore plant incoming inspection of raw material and quality control of forging and heat treatment must be reinforced in the course of manufacturing. C&U group always hold a strict control for this.

● Clearance change failure

Clearance change failure refers to the "seizure" caused by change of original fit clearance and loss of accuracy under the influence of external or internal factor. The main cause of clearance change failure include external factors such as excessive interference amount, improper installation, temperature rise, instantaneous overload etc. as well as internal factors such as unstable state of retained austenite and residual stress.

It is learnt from the common failure mechanism and failure mode of bearing that premature failure mostly related to such factors as manufacturing precision of machine fitting section, installation quality, working conditions, lubricating effect, exterior impurity penetration, heating effect as well as sudden failure of machine etc. Therefore, the correct and reasonable use of bearing is a essential engineering. The service life of bearing and machine could be effectively advanced if we adopt relevant steps targeting the cause of failure in the process of structure design, manufacture and installation of bearing. C&U group can work out reasonable system solutions according to needs of different customers. Table 13.1 illustrates some representative examples of bearing failures.

Rolling Bearing Failure Examples

Table 13.1 Forms and graphics of rolling bearing failure

Phenomena	
Flaking As bearings rotate under load, the material of the inner and outer raceways and surfaces of the rolling elements are under a cycle of applying and removing stress causing material fatigue. Under these conditions, the material will eventually flake away from the surface. 	**Causes** - Unsatisfactory precision of shaft and bearing housing, insufficient rigidity of bearing housing - Overloading of bearing - Large deflection of shaft - Impurity invasion, water penetration - Insufficient lubrication, improper lubricant - Improper bearing clearance - Scratch and indentation **Countermeasures** - Inspect the magnitude of load and reexamine the bearing used - Improve mounting method - Improve sealing device, rust preventive during shutdown - Change viscosity of lubricant and adopt relevant lubricating method - Inspect precision of shaft and bearing housing - Inspect internal clearance
Abrasion corrosion Bearing abrasion corrosion refers to the abrasion phenomenon caused by vibration or small vibration under static state. It happens on the contact part of raceway and rolling element. It is also called fretting corrosion due to the production of reddish brown or black wear powder. 	**Causes** - Poor lubrication - Small amplitude oscillations - Insufficient interference amount **Countermeasures** - Adopt suitable lubricant - Add preloading - Check interference amount - Fill lubricant on the fitting surface

*Some pictures refer to bearing failure examples from domestic and foreign bearing manufacturers.

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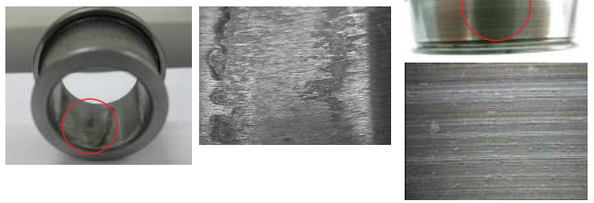
Phenomena

Wear

Wear mostly occurs to sliding friction surfaces such as roller end surface and rib surface, cage pocket surface as well as guide surface of bearing ring etc. The occurrence of these phenomena is not directly related to fatigue of materials.



Causes

- Impurity penetration, rustiness electric pitting
- Improper or insufficient lubricating
- Slip caused by irregular movement of rolling element

Countermeasures

- Improve sealing device
- Reconsider choice of lubricant and lubricating method
- Clean bearings

Burn

Bearing rings, rolling elements as well as cages heat up quickly until occurrence of discoloration, softening, fusion and abrasion.

Causes

- Overload of bearing (too much preload)
- Rotation speed is too high
- Clearance is too small
- Water and impurity penetration
- Inaccuracy of shaft and bearing housing, large deflection of shaft

Countermeasures

- Study lubricant and lubricating method
- Precise model selection
- Study fitting, bearing clearance and preload
- Improve sealing device
- Inspect precision of shaft and bearing housing
- Improve method of mounting

Electric pitting

Electric pitting refers to the phenomenon that electric current flows in the contacting section of bearing ring and rolling element and sparks via thin lubricating oil film when the bearing is running. The electrical pits will occur on the surface of raceway which will further develops into ripple shape.

Causes

- Bearing is conductive and potential diference occurs between inner ring and outer ring.

Countermeasures

- Provide a bypass which prevents current from passing through bearings
- Take insulating measures to avoid electric current getting through the bearing

Phenomena

Discoloration

Bearing ring, rolling element and cage will discolor because of temperature rise and their interactions with lubricants.

Causes

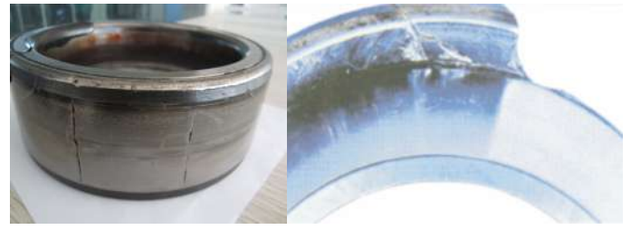
- Lubricant not good
- The interaction with lubricant brings about color change and temperature rise

Countermeasures

- Improve lubricating method

Fracture

Fracture refers to the situation that small part of the bearing fractures because impact or too much load is imposed upon rib of bearing ring or part of roller chamfer.



Causes

- Impact suffered during installation
- Over load
- Use error such as falling
- Quality of heat treatment

Countermeasures

- Improve method of mounting (adopt heat charging and proper tools)
- Rectify load-up condition
- Bearing is mounted properly so that the rib can take load.

Rust corrosion

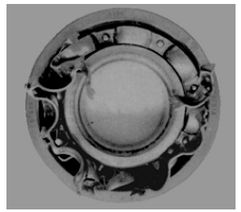
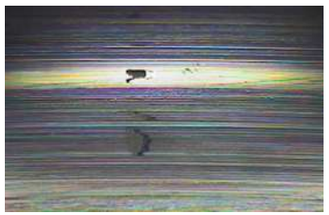
The rust corrosion of bearing is demonstrated in many ways such as crater or flecked rust on the surface of rolling element and bearing rings.

Causes

- Penetration of water and corrosive medium
- Improper lubricants
- Stop running under high temperature and humidity
- Poor rust prevention in transportation process
- Poor storage condition

Countermeasures

- Improve sealing device
- Study lubricating method
- Rust prevention after shutdown
- Improve storage method
- Use carefully

Phenomena		
Cage damage The damage of cage could be deformation, break, abrasion etc. For example, break of beam, deformation of end face, pocket break and abrasion of guide surface.  	Causes	- Poor installation (non-linearity of bearing) - Improper use - Large torque load - Large impact and vibration - Abrupt change of rotation speed or too fast rotation speed - Improper lubrication - Over-high temperature
	Countermeasures	- Inspect the method of installation - Inspect conditions such as load, temperature etc. - Reduce vibration - Change lubricant or lubricating method
Indentations The indentations generated on the surface of raceway groove or roller after tiny metal powder entered.  	Causes	- The penetration of impurities like metal powder etc. - Impact in assembling or transportation process - Overload - Impact to shaft sleeve
	Countermeasures	- Improve sealing device - Filtration of lubricating oil - Improve assembly and method of application

*Some pictures refer to bearing failure examples from domestic and foreign bearing manufacturers.

Phenomena		
False brinell indentation During the period of microvibration, the wear of the contact part between the rolling body and the ring develops due to vibration and sway, producing an indentation similar to brinelling indentation.  	Causes	- Vibration and oscillation during transportation or when the bearing stops - Small amplitude oscillations - Improper lubrication
	Countermeasures	- The shaft and bearing housing should be fixed during transportation. - The inner ring and outer ring of separable bearing should be packed separately during transportation. - Add preload to alleviate vibration - Use proper lubricant
Creep Creep refers to the phenomenon that space exists in the fitting surface and slip occurs, in which bearing rings move to the shaft or housing. Brightness or darkness can be found on the fitting surface, sometimes accompanied by discoloration or scratch.  	Causes	- Insufficient interference allowance - Insufficient fastening of adapter sleeve for clearance fit - Abnormal heating up or overload
	Countermeasures	- Inspect interference allowance - Fix adapter sleeve adequately - Study precision of shaft and bearing housing - Preload in axial direction - Fastening of bearing ring in axial direction - Fill lubricant on the fitting surface

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Bearing specification table

Miniature and small deep groove ball bearing

Miniature and small deep groove ball bearing

Miniature and small deep groove ball bearing

1. Structure

Miniature and small ball bearings are applicable to various conditions requiring high rotating speed, low friction torque, low vibration and low-noise. This type of bearing mainly takes radial load and can also withstand small axial loads. The differences between miniature and small ball bearings are shown in Table 1.

Table 1 Dimension range of bearings

Unit: mm

Categories	Small ball bearing	Miniature ball bearing
Metric series	Outside diameter≥9	Outside diameter<9
	Bore diameter<10	
Inch series	Outside diameter≥9.525	Outside diameter<9.525
	Bore diameter<10	

Table 2 Structures and codes of miniature and small ball bearings

Structure	Structure code				Remarks
	Metric series	Inch series	Specific dimension		
			Metric series	Inch series	
	600	R	MR	——	Shield or sealed
 Thin type	—	——	SMT	——	
 With snap rib	F600	FR	MF	——	Shield or sealed
 Wider inner ring	—	——	——	RW	Shield
 With snap rib and wider inner ring	—	——	——	FRW	Shield
 For synchronization	—	——	——	SR00×00	Shield

2. Clearance

Please refer to Table 3 for the clearance of miniature and small deep groove ball bearing.

Table 3 Radial clearances of miniature and small ball bearings

Unit:μm

Clearance code	M1		M2		M3		M4		M5		M6	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Clearance	0	5	3	8	5	10	8	13	13	20	20	28

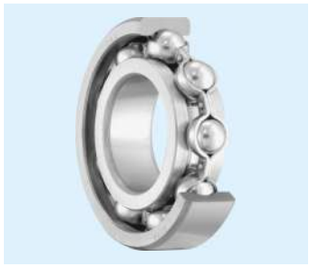
Remarks: In case of any question, please contact with C&U Group.

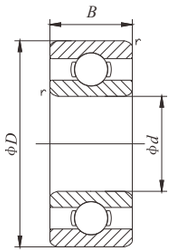
Table 4 Radial clearance correction

Unit:μm

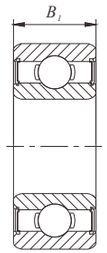
Clearance code	M1	M2	M3	M4	M5	M6
Clearance correction value	1	1	1	1	1	1

The load tested is as follows:
Miniature ball bearing 2.5N (0.25kgf)
Small ball bearing 4.4N (0.45kgf)
Note: Besides the standard miniature ball bearing listed in the specification table, special bearings for computer hard drives and medical handpieces are also available.

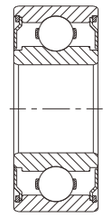




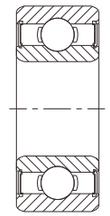
Open type



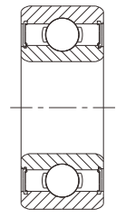
Shielded type
Z



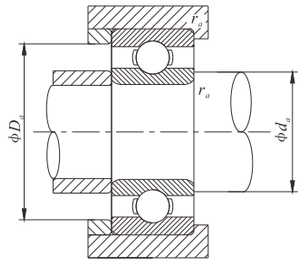
ZV



Non-contact seal type
RZ



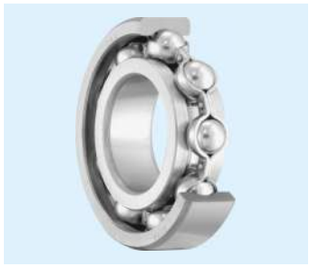
Contact seal type
RS

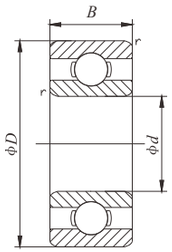


d **1.5~5mm**

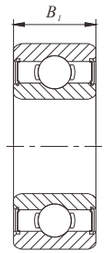
Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Bearing numbers		Mounting dimensions (mm)				Reference mass (g)
d	D	B	B_1	r (Min)	C_r	C_{0r}	Grease	Oil			d_a Min	d_a Max	D_a Max	r_a Max	Open
1.5	4	1.2	2	0.15	0.10	0.03	88000	100000	**68/1.5**		2.3	2.4	3.2	0.05	0.07
	5	2	2.6	0.15	0.17	0.05	79000	93000	**69/1.5A**		2.7	2.9	3.8	0.05	0.18
	6	2.5	3	0.15	0.28	0.09	71000	84000	**60/1.5**		2.7	3	4.8	0.15	0.35
2	4	1.2	2	0.05	0.10	0.04	83000	98000	**672**		2.5	2.6	3.5	0.05	0.06
	5	1.5	2.3	0.08	0.17	0.05	74000	87000	**682**		2.8	2.9	4.2	0.08	0.13
	6	2.3	3	0.15	0.28	0.09	67000	79000	**692**		3.2	3.3	4.8	0.15	0.31
	7	2.8	3.5	0.15	0.38	0.13	62000	73000	**602**		3.2	3.7	5.8	0.15	0.54
2.5	5	1.5	2.3	0.08	0.15	0.06	70000	82000	**67/2.5**		3.1	3.3	4.4	0.08	0.11
	6	1.8	2.6	0.08	0.21	0.07	65000	76000	**68/2.5**		3.1	3.6	4.8	0.08	0.22
	7	2.5	3.5	0.15	0.28	0.10	59000	70000	**69/2.5**		3.7	4	5.8	0.15	0.43
	8	2.8	4	0.15	0.55	0.17	56000	66000	**60/2.5**		3.7	4.1	6.8	0.15	0.72
3	6	2	2.5	0.08	0.24	0.09	60000	71000	**673**		3.6	4.1	5.4	0.08	0.2
	7	2	3	0.1	0.39	0.13	58000	68000	**683**		3.9	4.1	5.8	0.1	0.33
	8	3	4	0.15	0.56	0.18	54000	63000	**693**		4.2	4.4	6.8	0.15	0.61
	9	3	5	0.15	0.64	0.22	50000	59000	**603**		4.2	5	7.8	0.15	0.92
	10	4	4	0.15	0.64	0.22	50000	58000	**623**		4.2	5.2	8.8	0.15	1.6
4	9	2.5	4	0.15	0.64	0.22	49000	57000	**684**		5	5.2	7.8	0.1	0.76
	11	4	4	0.15	0.72	0.28	45000	52000	**694**		5.2	6.4	9.8	0.15	2
	12	4	4	0.2	0.97	0.36	43000	51000	**604**		5.6	6.6	10.4	0.2	2.3
	13	5	5	0.2	1.31	0.49	42000	49000	**624**		5.6	6.2	11.4	0.2	3.5
	16	5	5	0.3	1.76	0.68	37000	44000	**634**		6	7.6	14	0.3	5.1
5	8	2	2.5	0.08	0.22	0.09	49000	57000	**675**		5.6	6	7.4	0.08	0.32
	11	3	5	0.15	0.72	0.28	43000	51000	**685**		6.2	6.8	9.8	0.15	1.1
	13	4	4	0.2	1.08	0.43	40000	47000	**695**		6.6	6.9	11.4	0.2	2.4
	14	5	5	0.2	1.33	0.51	39000	46000	**605**		6.6	7.4	12.4	0.2	3.5
	16	5	5	0.3	1.76	0.68	37000	44000	**625**		7	7.6	14	0.3	4.8
	19	6	6	0.3	2.34	0.89	34000	40000	**635**		7	9.5	17	0.3	8

Remark: width for open type is B and shielded type is B_1.

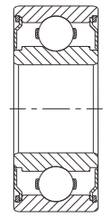




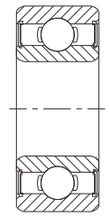
Open type



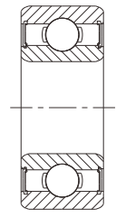
Shielded type
Z



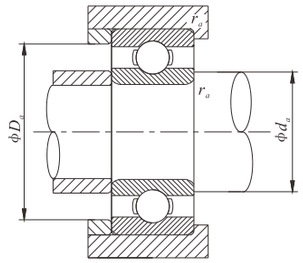
ZV



Non-contact seal type
RZ



Contact seal type
RS

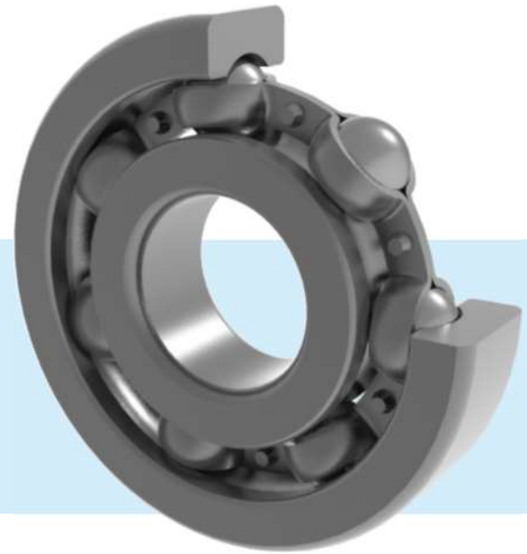


d 6~9 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Bearing numbers		Mounting dimensions (mm)				Reference mass (g)
d	D	B	B_1	r (Min)	C_r	C_{0r}	Grease	Oil			d_a Min	d_a Max	D_a Max	r_a Max	Open
6	13	3.5	5	0.15	1.08	0.44	39000	46000	**686**		7.0	7.2	11.8	0.2	1.9
	15	5	5	0.2	1.35	0.53	37000	44000	**696**		7.6	7.8	13.4	0.2	3.8
	17	6	6	0.3	2.19	0.865	35000	42000	**606**		8.0	8.6	15.0	0.3	6.0
	19	6	6	0.3	2.34	0.885	34000	40000	**626**		8.0	9.5	17.0	0.3	8.1
7	11	2.5	3	0.1	0.56	0.269	40000	47000	**677**		7.8	8.1	10.2	0.1	0.7
	14	3.5	5	0.15	1.17	0.505	37000	44000	**687**		8.2	8.7	12.8	0.2	2.1
	17	5	5	0.3	1.61	0.715	35000	41000	**697**		9.0	10.0	15.0	0.3	5.2
	19	6	6	0.3	2.24	0.91	34000	40000	**607**		9.0	10.4	17.0	0.3	8.0
	22	7	7	0.3	3.35	1.4	32000	37000	**627**		9.0	12.2	20.0	0.3	13.0
8	16	4	5	0.2	1.61	0.715	35000	41000	**688**		9.6	10.0	14.4	0.2	3.1
	19	6	6	0.3	1.99	0.865	33000	39000	**698**		10.0	10.6	17.0	0.3	7.3
	22	7	7	0.3	3.35	1.4	32000	37000	**608**		10.0	12.2	20.0	0.3	12.0
	24	8	8	0.3	4.00	1.59	31000	36000	**628**		10.0	12.1	22.0	0.3	17.0
9	14	3	4.5	0.1	0.92	0.465	36000	42000	**679**		9.8	10.4	13.2	0.1	1.4
	17	4	5	0.2	1.72	0.82	33000	39000	**689**		10.6	10.7	15.4	0.2	3.2
	20	6	6	0.3	2.48	1.09	32000	38000	**699**		11.0	11.6	18.0	0.3	8.2
	24	7	7	0.3	3.40	1.45	31000	36000	**609**		11.0	13.1	22.0	0.3	14.0
	26	8	8	0.6	4.55	1.96	30000	35000	**629**		13.0	13.9	22.0	0.3	20.0

Remark: width for open type is B and shielded type is B_1.

Single row deep groove ball bearing



Single row deep groove ball bearing

Deep groove ball bearing

1. Outline

Deep groove ball bearing is one of the most common rolling bearings. The deep-grooved raceway and the excellent conformity between the raceway and steel balls make the deep groove ball bearing capable of carrying axial loads in both directions in addition to radial loads, even under high-speed conditions.

The friction coefficient of deep groove ball bearings is very low, and their speed limit is very high. The shielded bearings can work without re-lubrication and maintenance.

Except basic types, deep groove ball bearings have various structures, such as:

Deep groove ball bearing with shields;
Deep groove ball bearing with rubber seals;
Deep groove ball bearing with snap ring;
Deep groove ball bearing with filling slot;
Double row deep groove ball bearing.

1) Deep groove ball bearing with shields

The function of the dust cover is to prevent grease leakage and foreign matter intrusion in the bearing. Dust covers are divided into one- sided and two- sided structure.

Bearings with shields can be used to situations requiring low friction torque and in high temperature but are difficult for re-lubrication and monitoring lubricant condition. The grease amount for each bearing is usually 1/4 ~ 1/3 of the available space of the bearing, and can also be varied according to the customer's requirements. The grease fill can usually ensure bearing operation at temperatures ranging from -40 to + 120°C. C&U is capable of providing solutions if there are higher requirements for the bearing.

Bearings with shields can work for a long time effectively after filled with grease, and there is no need for replenishment during this period.

Bearings with shields are normally used in small and medium generators, both ends of the rotors of electrical motors, automobiles, tractors, air conditioners, fans, etc., as well as the situations where there are special requirements for the noise and vibration of the bearings.

2) Deep groove ball bearing with rubber seals

Deep groove ball bearings with seals fall into contact type and non-contact type, and also single-side type and double-side type. Depending on the application, contact seals can be designed and manufactured into light contact type, medium contact type and heavy contact type.

The performance, lubrication, and usage of bearings with seals are identical with those of deep groove ball bearings with shields. The difference is that the clearance between the shield and the inner ring of the bearing is larger, while that between the non-contact seal and inner ring of the bearing is smaller. There is no clearance between the sealing lip and the inner ring of a bearing with a contact seal, which ensures a good sealing effect, but also increases the friction.

Small-size deep groove ball bearings of 60 and 62 series are often used in situations where low noise is required. Requirements for low noise and low vibration can be raised for both open bearings and shielded bearings (bearings with shields or seals) when they are specified.

3) Deep groove ball bearings with snap ring grooves and snap rings

The structure with snap ring groove, snap ring or flange on the outer ring can realize axial location and simplify the mounting structure of housing.

Deep groove ball bearings with snap ring grooves and snap rings are often applied to automobiles, tractors etc.

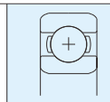
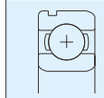
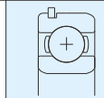
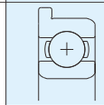
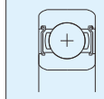
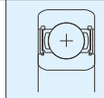
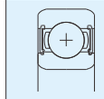
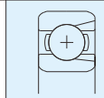
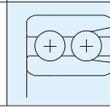
4) Deep groove ball bearing with filling slot

The boundary dimensions of deep groove ball bearings with filling slot are identical with those of deep groove ball bearings of series 62 or 63. There are filling slots on both the inner and outer rings, so the number of steel balls are more than that of normal deep groove ball bearings and the dynamic load rating is 20 ~ 35% higher.

Due to the filling slot, they are not suitable for the situations with high axial load. The condition that the dynamic equivalent radial load $P_r < 0.5C_{0r}$ should be met when used in combined loads where radial loads are the primary component.

5) Double row deep groove ball bearing

Please contact C&U for more information.

Basic structure Open		The most popular basic structure, expressed by basic number, e.g. 6204
Structure of bearing with snap ring groove		With a "N" after the number, e.g. 6204N
Structure of bearing with snap ring		With a "NR" after the number, e.g. 6208NR
Structure of bearing with flange		A "F" is added before the code, usually for miniature bearing. e.g. F683
Shielded seal structure		With a "Z"after the code, "Z" for single-side type and "2Z" for double-side type, e.g. 6204-Z, 6204-2Z
Non-contact seal structure		With a "RZ" after the code, "RZ" for single-side type and "2RZ" for double-side type, e.g. 6204-RZ, 6204-2RZ
Contact seal structure		With a "RS "after the code, "RS" for single-side type and 2RS "for double-side type, e.g. 6204-RS, 6204-2RS
Heavy load deep groove ball bearing		Bearing load capacity can be increased by increasing the number of steel balls for non-standard bearings, with an "E" after the code, e.g. 6210E
Double row deep groove ball bearing		Normally two series, 42XX and 43XX, e.g. 4205, 4305

2. Seal

Performance comparison of deep groove ball bearing with seals

Features \ Types	With shield	With seals		
	Non-contact type	Non-contact type	Contact type	Light contact type
	2Z	2RZ	2RS	2RSL
Friction torque	Low	Low	Medium	Lower than contact type
High performance	Better	Good	Limited	Better than contact type
Seal performance of grease	Better	Better than ZZ type	Excellent	Excellent
Dust proof	Better	Better than ZZ type, can also be used where there are much powder	Excellent	Excellent
Water proof	Not recommended	Better than ZZ type, inferior to 2RS	Excellent	Good
Temperature range for application	-30℃～+110℃		-30℃～+110℃	-30℃～+110℃

Note: Here is the applicable temperature for standard bearings. Changes for the types of lubricating grease and material of seals can expand the range.

3. Dynamic equivalent radial load

$P_r=XF_r+YF_a$

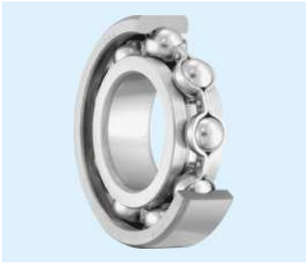
The values of X and Y are determined by the ratio of the axial load F_a and basic static load rating the bearing. Please refer to the following table for the coefficients of X and Y:

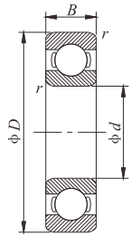
Relative axial load	Single row bearing				
	$\frac{F_a}{F_r} \leqslant e$		$\frac{F_a}{F_r} > e$		e
$\frac{f_0F_a}{C_{0r}}$	X	Y	X	Y	
0.172				2.3	0.19
0.345				1.99	0.22
0.689				1.71	0.26
1.03				1.55	0.28
1.38	1	0	0.56	1.45	0.3
2.07				1.31	0.34
3.45				1.15	0.38
5.17				1.04	0.42
6.89				1	0.44

4. Static equivalent radial load

$P_{0r}=0.6F_r+0.5F_a$

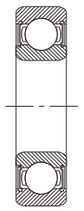
When $P_{0r}<F_r$, take $P_{0r}=F_r$





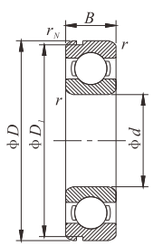
Open type

Shielded type
Z

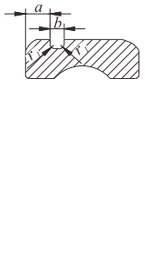


Non-contact seal type
RZ

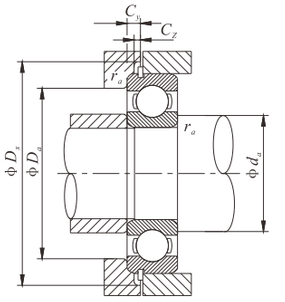
Contact seal type
RS



With snap ring groove

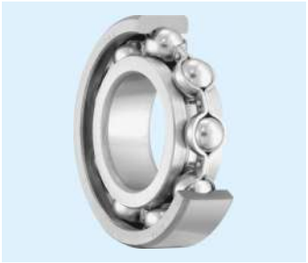


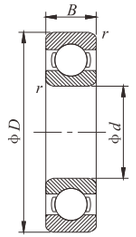
With snap ring



d **10~17 mm**

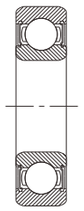
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds(r/min)			Nominal numbers	Nominal numbers (old)	Dimension of snap ring groove (mm)					Dimension of snap ring(mm)		Mounting dimensions (mm)							Reference mass (kg)
						Grease		Oil																	
d	D	B	r (Min)	C_r	C_{0r}	Non-contact type	Contact type	Open			a Max	b Min	D_1 Max	r_1 Max	r_N Min	D_2 Max	f Max	d_a Min	d_a Max	D_a Max	r_a Max	D_X Min	C_y Max	C_z Max	
10	15	4	0.1	0.86	0.44	10,000	—	12,000	**61700**	**—**	—	—	—	—	—	—	—	10.8	—	14.2	0.1	—	—	—	0.002
	19	5	0.3	1.83	0.93	32,000	24,000	38,000	**61800**	**1000800**	—	—	—	—	—	—	—	12	12.5	17	0.3	—	—	—	0.005
	22	6	0.3	2.70	1.27	30,000	21,000	36,000	**61900**	**1000900**	1.05	0.8	20.8	0.2	0.3	24.8	0.7	12	13	20	0.3	25.5	1.5	0.7	0.009
	26	8	0.3	4.55	1.97	29,000	21,000	34,000	**6000**	**100**	—	—	—	—	—	—	—	12	13.5	24	0.3	—	—	—	0.018
	30	9	0.6	5.10	2.39	25,000	18,000	30,000	**6200**	**200**	2.06	1.35	28.17	0.4	0.5	34.7	1.12	14	16	26	0.6	35.5	2.9	1.2	0.032
	35	11	0.6	8.10	3.45	23,000	16,000	27,000	**6300**	**300**	2.06	1.35	33.17	0.4	0.5	39.7	1.12	14	17	31	0.6	40.5	2.9	1.2	0.053
12	18	4	0.2	1.10	0.70	8,300	—	9,500	**61701**	**—**	—	—	—	—	—	—	—	13.6	13.8	16.4	0.2	—	—	—	0.002
	21	5	0.3	1.92	1.04	29,000	20,000	35,000	**61801**	**1000801**	—	—	—	—	—	—	—	14	14.5	19	0.3	—	—	—	0.006
	24	6	0.3	2.89	1.46	27,000	19,000	32,000	**61901**	**1000901**	1.05	0.8	22.8	0.2	0.3	26.8	0.7	14	15	22	0.3	27.5	1.5	0.7	0.011
	28	7	0.3	5.10	2.37	26,000	—	30,000	**16001**	**7000101**	—	—	—	—	—	—	—	14	—	26	0.3	—	—	—	0.019
	28	8	0.3	5.10	2.37	26,000	18,000	30,000	**6001**	**101**	—	—	—	—	—	—	—	14	16	26	0.3	—	—	—	0.022
	32	10	0.6	6.82	3.06	22,000	16,000	26,000	**6201**	**201**	2.06	1.35	30.15	0.4	0.5	36.7	1.12	16	17	28	0.6	37.5	2.9	1.2	0.037
	37	12	1	9.70	4.20	20,000	15,000	24,000	**6301**	**301**	2.06	1.35	34.77	0.4	0.5	41.3	1.12	17	18.5	32	1	42	2.9	1.2	0.060
15	21	4	0.2	0.94	0.58	6,600	—	7,600	**61702**	**—**	—	—	—	—	—	—	—	16.6	16.8	19.4	0.2	—	—	—	0.003
	24	5	0.3	2.10	1.25	26,000	17,000	31,000	**61802**	**1000802**	—	—	—	—	—	—	—	17	17.5	22	0.3	—	—	—	0.007
	28	7	0.3	4.30	2.30	24,000	16,000	28,000	**61902**	**1000902**	1.3	0.95	26.7	0.25	0.3	30.8	0.85	17	17.5	26	0.3	31.5	1.9	0.9	0.016
	32	8	0.3	5.60	2.84	24,000	—	26,000	**16002**	**7000102**	—	—	—	—	—	—	—	17	—	30	0.3	—	—	—	0.025
	32	9	0.3	5.60	2.84	22,000	15,000	26,000	**6002**	**102**	2.06	1.35	30.15	0.4	0.3	36.7	1.12	17	19	30	0.3	37.5	2.9	1.2	0.030
	35	11	0.6	7.60	3.70	19,000	15,000	23,000	**6202**	**202**	2.06	1.35	33.17	0.4	0.5	39.7	1.12	19	20	31	0.6	40.5	2.9	1.2	0.045
	42	13	1	11.40	5.43	17,000	12,000	21,000	**6302**	**302**	2.06	1.35	39.75	0.4	0.5	46.3	1.12	20	23	37	1	47	2.9	1.2	0.082
17	23	4	0.2	1.00	0.66	5,000	—	6,700	**61703**	**—**	—	—	—	—	—	—	—	18.6	18.8	21.4	0.2	—	—	—	0.003
	26	5	0.3	2.20	1.50	24,000	15,000	28,000	**61803**	**1000803**	—	—	—	—	—	—	—	19	19.5	24	0.3	—	—	—	0.008
	30	7	0.3	4.60	2.60	22,000	14,000	26,000	**61903**	**1000903**	1.3	0.95	28.7	0.25	0.3	32.8	0.85	19	20	28	0.3	33.5	1.9	0.9	0.018
	35	8	0.3	6.00	3.25	20,000	—	24,000	**16003**	**7000103**	—	—	—	—	—	—	—	19	—	33	0.3	—	—	0.9	0.032
	35	10	0.3	6.00	3.25	20,000	14,000	24,000	**6003**	**103**	2.06	1.35	33.17	0.4	0.3	39.7	1.12	19	21	33	0.3	40.5	2.9	1.2	0.039
	40	12	0.6	9.57	4.80	18,000	12,000	21,000	**6203**	**203**	2.06	1.35	38.1	0.4	0.5	44.6	1.12	21	23	36	0.6	45.5	2.9	1.2	0.066
	47	14	1	13.60	6.60	16,000	11,000	19,000	**6303**	**303**	2.46	1.35	44.6	0.4	0.5	52.7	1.12	22	25	42	1	53.5	3.3	1.2	0.115
	62	17	1.1	28.80	10.60	14,000	—	16,000	**6403**	**403**	—	—	—	—	—	—	—	23.5	—	55.5	1	—	—	—	0.270





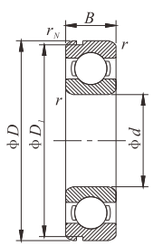
Open type

Shielded type
Z

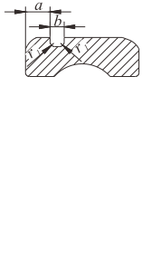


Non-contact seal type
RZ

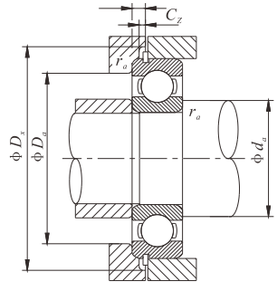
Contact seal type
RS



With snap ring groove

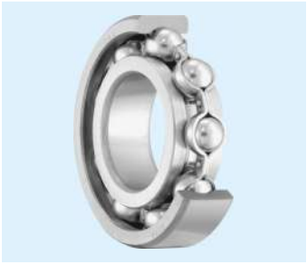


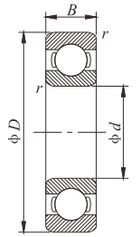
With snap ring



d 20~30 mm

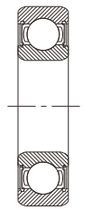
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds(r/min)			Nominal numbers	Nominal numbers (old)	Dimension of snap ring groove (mm)					Dimension of snap ring(mm)		Mounting dimensions (mm)							Reference mass (kg)
						Grease		Oil																	
d	D	B	r (Min)	C_r	C_{0r}	Non-contact type	Contact type	Open			a Max	b Min	D_1 Max	r_1 Max	r_N Min	D_2 Max	f Max	d_a Min	d_a Max	D_a Max	r_a Max	D_X Min	C_y Max	C_z Max	
20	27	4	0.2	1.04	0.73	5,000	—	5,700	6704	—	—	—	—	—	—	—	—	21.6	22.3	25.4	0.2	—	—	—	0.005
	32	7	0.3	3.50	2.20	21,000	13,000	25,000	61804	1000804	1.3	0.95	30.7	0.25	0.3	34.8	0.85	22	22.5	30	0.3	35.5	1.9	0.9	0.019
	37	9	0.3	6.40	3.70	19,000	12,000	23,000	61904	1000904	1.7	0.95	35.7	0.25	0.3	39.8	0.85	22	24	35	0.3	40.5	2.3	0.9	0.036
	42	8	0.3	6.30	3.80	18,000	—	21,000	16004	7000104	—	—	—	—	—	—	—	22	—	40	0.3	—	—	—	0.051
	42	12	0.6	9.38	5.03	18,000	11,000	21,000	6004	104	2.06	1.35	39.75	0.4	0.5	46.3	1.12	24	26	38	0.6	47	2.9	1.2	0.069
	47	14	1	12.80	6.60	16,000	10,000	18,000	6204	204	2.46	1.35	44.6	0.4	0.5	52.7	1.12	25	26	42	1	53.5	3.3	1.2	0.106
	52	15	1.1	15.90	7.80	14,000	10,000	17,000	6304	304	2.46	1.35	49.73	0.4	0.5	57.9	1.12	26.5	28.5	45.5	1	58.5	3.3	1.2	0.144
	72	19	1.1	28.50	13.90	12,000	—	14,000	6404	404	—	—	—	—	—	—	—	26.5	—	65.5	1	—	—	—	0.400
22	44	12	0.6	9.40	5.05	17,000	10,000	20,000	60/22	1/22	2.06	1.35	41.75	0.4	0.5	48.3	1.12	26	26.5	40	0.6	49	2.9	1.2	0.074
	50	14	1	12.90	6.80	14,000	9,700	17,000	62/22	2/22	2.46	1.35	47.6	0.4	0.5	55.7	1.12	27	29.5	45	1	56.5	3.3	1.2	0.117
	56	16	1.1	18.40	9.25	13,000	9,200	15,000	63/22	3/22	2.46	1.35	53.6	0.4	0.5	61.7	1.12	28.5	31	49.5	1	62.5	3.3	1.2	0.176
25	32	4	0.2	1.89	1.50	4,000	—	4,600	6705	—	—	—	—	—	—	—	—	26.6	27.3	30.4	0.2	—	—	—	0.005
	37	7	0.3	4.30	2.95	18,000	10,000	21,000	61805	1000805	1.3	0.95	35.7	0.25	0.3	39.8	0.85	27	28	35	0.3	40.5	1.9	0.9	0.022
	42	9	0.3	7.02	4.53	16,000	9,800	19,000	61905	1000905	1.7	0.95	40.7	0.25	0.3	44.8	0.85	27	29	40	0.3	45.5	2.3	0.9	0.042
	47	8	0.3	7.00	4.60	15,000	—	18,000	16005	7000105	—	—	—	—	—	—	—	27	—	45	0.3	—	—	—	0.060
	47	12	0.6	10.07	5.82	15,000	9,400	18,000	6005	105	2.06	1.35	44.6	0.4	0.5	52.7	1.12	29	30	43	0.6	53.5	2.9	1.2	0.080
	52	15	1	14.00	7.88	13,900	8,900	15,000	6205	205	2.46	1.35	49.73	0.4	0.5	57.9	1.12	30	32	47	1	58.5	3.3	1.2	0.128
	62	17	1.1	20.60	11.20	12,000	8,100	14,000	6305	305	3.28	1.9	59.61	0.6	0.5	67.7	1.7	31.5	35	55.5	1	68.5	4.6	1.7	0.232
	80	21	1.5	34.50	17.50	11,000	—	12,000	6405	405	—	—	—	—	—	—	—	33	—	72	1.5	—	—	—	0.530
28	52	12	0.6	12.50	7.40	14,000	8,400	16,000	60/28	1/28	2.06	1.35	49.73	0.4	0.5	57.9	1.12	32	34	48	0.6	58.5	2.9	1.2	0.098
	58	16	1	17.90	9.75	12,000	8,100	14,000	62/28	2/28	2.46	1.35	55.6	0.4	0.5	63.7	1.12	33	35.5	53	1	64.5	3.3	1.2	0.171
	68	18	1.1	26.70	14.00	11,000	7,400	13,000	63/28	3/28	3.28	1.9	64.82	0.6	0.5	74.6	1.7	34.5	38.5	61.5	1	76	4.6	1.7	0.284
30	37	4	0.2	1.14	0.95	3,300	—	3,800	6706	—	—	—	—	—	—	—	—	31.6	32.3	35.4	0.2	—	—	—	0.006
	42	7	0.3	4.96	3.62	15,000	8,800	18,000	61806	1000806	1.3	0.95	40.7	0.25	0.3	44.8	0.85	32	33	40	0.3	45.5	1.9	0.9	0.026
	47	9	0.3	7.24	5.00	14,000	8,400	17,000	61906	1000906	1.7	0.95	45.7	0.25	0.3	49.8	0.85	32	34	45	0.3	50.5	2.3	0.9	0.048
	55	9	0.3	9.20	6.30	13,000	—	15,000	16006	7000106	—	—	—	—	—	—	—	32	—	53	0.3	—	—	—	0.091
	55	13	1	13.20	8.27	13,000	7,700	15,000	6006	106	2.08	1.35	52.6	0.4	0.5	60.7	1.12	35	37	50	1	61.5	2.9	1.2	0.116
	62	16	1	19.50	11.30	11,000	7,300	13,000	6206	206	3.28	1.9	59.61	0.6	0.5	67.7	1.7	35	39	57	1	68.5	4.6	1.7	0.199



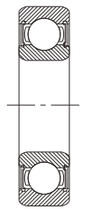


Open type

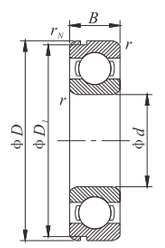
Shielded type
Z



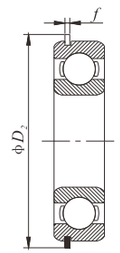
Non-contact seal type
RZ



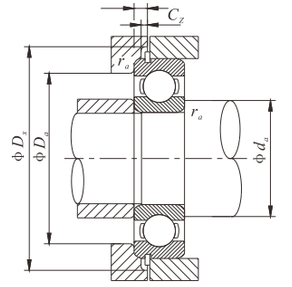
Contact seal type
RS



With snap ring groove

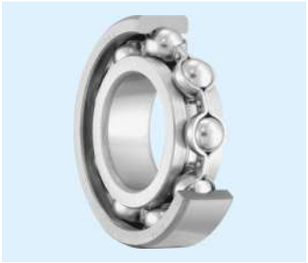


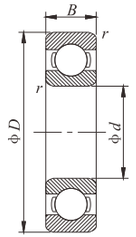
With snap ring



d 30~50 mm

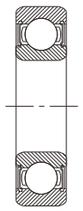
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds(r/min)			Nominal numbers	Nominal numbers (old)		Dimension of snap ring groove (mm)					Dimension of snap ring(mm)		Mounting dimensions (mm)							Reference mass (kg)
						Grease		Oil																		
d	D	B	r (Min)	C_r	C_{0r}	Non-contact type	Contact type	Open				a Max	b Min	D_1 Max	r_1 Max	r_N Min	D_2 Max	f Max	d_a Min	d_a Max	D_a Max	r_a Max	D_X Min	C_y Max	C_z Max	
30	72	19	1.1	26.70	15.00	10,000	6,600	12,000	6306	306		3.28	1.9	68.81	0.6	0.5	78.6	1.7	36.5	43	65.5	1	80	4.6	1.7	0.360
	90	23	1.5	43.50	23.90	8,800	—	10,000	6406	406		—	—	—	—	—	—	—	38	—	82	1.5	—	—	—	0.735
32	58	13	1	11.80	8.05	12,000	7,200	15,000	60/32	1/32		2.08	1.35	55.6	0.4	0.5	63.7	1.12	37	39	53	1	64.5	2.9	1.2	0.129
	65	17	1	20.70	11.60	11,000	7,100	12,000	62/32	2/32		3.28	1.9	62.6	0.6	0.5	70.7	1.7	37	40	60	1	71.5	4.6	1.7	0.226
	75	20	1.1	29.80	16.90	9,500	6,500	11,000	63/32	3/32		3.28	1.9	71.83	0.6	0.5	81.6	1.7	38.5	43.5	68.5	1	83	4.6	1.7	0.382
35	47	7	0.3	4.20	3.50	13,000	7,600	16,000	61807	1000807		1.3	0.95	45.7	0.25	0.3	49.8	0.85	37	38	45	0.3	50.5	1.9	0.9	0.029
	55	10	0.6	9.60	6.80	12,000	7,100	15,000	61907	1000907		1.7	0.95	53.7	0.25	0.5	57.8	0.85	39	40	51	0.6	58.5	2.3	0.9	0.074
	62	9	0.3	12.20	8.80	12,000	—	14,000	16007	7000107		—	—	—	—	—	—	—	37	—	60	0.3	—	—	—	0.110
	62	14	1	15.90	10.30	12,000	6,800	14,000	6007	107		2.08	1.9	59.61	0.6	0.5	67.7	1.7	40	42	57	1	68.5	3.4	1.7	0.155
	72	17	1.1	25.70	15.30	9,800	6,300	11,000	6207	207		3.28	1.9	68.81	0.6	0.5	78.6	1.7	41.5	45	65.5	1	80	4.6	1.7	0.288
	80	21	1.5	33.50	19.20	8,800	6,000	10,000	6307	307		3.28	1.9	76.81	0.6	0.5	86.6	1.7	43	47	72	1.5	88	4.6	1.7	0.457
	100	25	1.5	55.00	31.00	7,800	—	9,100	6407	407		—	—	—	—	—	—	—	43	—	92	1.5	—	—	—	0.952
40	52	7	0.3	5.07	4.37	12,000	6,700	14,000	61808	1000808		1.3	0.95	50.7	0.25	0.3	54.8	0.85	42	43	50	0.3	55.5	1.9	0.9	0.033
	62	12	0.6	13.70	9.90	11,000	6,300	13,000	61908	1000908		1.7	0.95	60.7	0.25	0.5	64.8	0.85	44	45	58	0.6	65.5	2.3	0.9	0.110
	68	9	0.3	12.60	9.65	10,000	—	12,000	16008	7000108		1.7	—	—	—	—	—	—	42	—	66	0.3	—	—	—	0.125
	68	15	1	16.80	11.50	10,000	6,100	12,000	6008	108		2.49	1.9	64.82	0.6	0.5	74.6	1.7	45	47	63	1	76	3.8	1.7	0.190
	80	18	1.1	30.80	19.80	8,700	5,600	10,000	6208	208		3.28	1.9	76.81	0.6	0.5	86.6	1.7	46.5	51	73.5	1	88	4.6	1.7	0.366
	90	23	1.5	40.70	24.00	7,800	5,300	9,200	6308	308		3.28	2.7	86.79	0.6	0.5	96.5	2.46	48	54	82	1.5	98	5.4	2.5	0.630
	110	27	2	52.50	30.2	7,000	—	8,200	6408	408		—	—	—	—	—	—	—	49	—	101	2	—	—	—	1.230
45	58	7	0.3	5.35	4.95	11,000	5,900	12,000	61809	1000809		1.3	0.95	56.7	0.25	0.3	60.8	0.85	47	48	56	0.3	61.5	1.9	0.9	0.038
	68	12	0.6	14.10	10.90	9,800	5,600	12,000	61909	1000909		1.7	0.95	66.7	0.25	0.5	70.8	0.85	49	51	64	0.6	72	2.3	0.9	0.128
	75	10	0.6	15.60	12.20	9,200	—	11,000	16009	7000109		—	—	—	—	—	—	—	49	—	71	0.6	—	—	—	0.171
	75	16	1	19.90	14.00	9,200	5,400	11,000	6009	109		2.49	1.9	71.83	0.6	0.5	81.6	1.7	50	52.5	70	1	83	3.8	1.7	0.237
	85	19	1.1	31.20	20.30	7,800	5,200	9,200	6209	209		3.28	1.9	81.81	0.6	0.5	91.6	1.7	51.5	55.5	78.5	1	93	4.6	1.7	0.398
	100	25	1.5	52.80	31.80	7,000	4,700	8,200	6309	309		3.28	2.7	96.8	0.6	0.5	106.5	2.46	53	61.5	92	1.5	108	5.4	2.5	0.814
	120	29	2	77.40	45.06	6,300	—	7,400	6409	409		—	—	—	—	—	—	—	54	—	111	2	—	—	—	1.530
50	65	7	0.3	6.58	6.08	9,600	5,300	11,000	61810	1000810		1.3	0.95	63.7	0.25	0.3	67.8	0.85	52	54	63	0.3	68.5	1.9	0.9	0.050





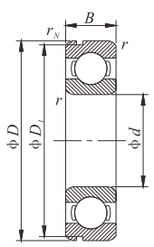
Open type

Shielded type
Z

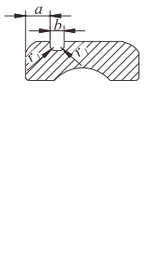


Non-contact seal type
RZ

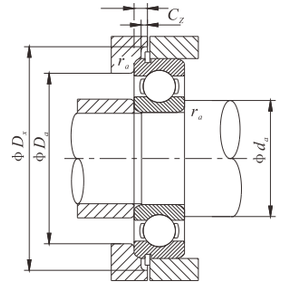
Contact seal type
RS



With snap ring groove

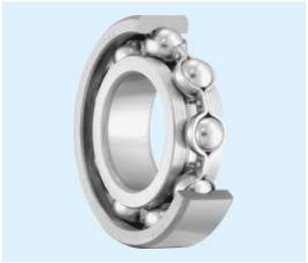


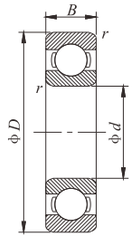
With snap ring



d 50~60 mm

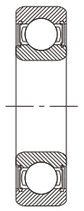
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds(r/min)			Nominal numbers	Nominal numbers (old)	Dimension of snap ring groove (mm)					Dimension of snap ring(mm)		Mounting dimensions (mm)							Reference mass (kg)
						Grease		Oil																	
d	D	B	r (Min)	C_r	C_{0r}	Non-contact type	Contact type	Open			a Max	b Min	D_1 Max	r_1 Max	r_N Min	D_2 Max	f Max	d_a Min	d_a Max	D_a Max	r_a Max	D_X Min	C_y Max	C_z Max	
50	72	12	0.6	16.10	13.10	9,000	5,300	11,000	61910	1000910	1.7	0.95	70.7	0.25	0.5	74.8	0.85	54	55.5	68	0.6	76	2.3	0.9	0.135
	80	10	0.6	16.10	13.10	8,500	—	10,000	16010	7000110	—	—	—	—	—	—	—	54	—	76	0.6	—	—	—	0.175
	80	16	1	21.80	16.60	8,500	4,800	10,000	6010	110	2.49	1.9	76.81	0.6	0.5	86.6	1.7	55	57.5	75	1	88	3.8	1.7	0.261
	90	20	1.1	35.00	23.20	7,100	4,700	8,300	6210	210	3.28	2.7	86.79	0.6	0.5	96.5	2.46	56.5	60	83.5	1	98	5.4	2.5	0.454
	110	27	2	62.00	38.50	6,400	4,200	7,500	6310	310	3.28	2.7	106.81	0.6	0.5	116.6	2.46	59	68.5	101	2	118	5.4	2.5	1.060
	130	31	2.1	83.00	49.50	5,700	—	6,700	6410	410	—	—	—	—	—	—	—	61	—	119	2	—	—	—	1.880
55	72	9	0.3	9.10	8.50	8,700	4,800	10,000	61811	1000811	1.7	0.95	70.7	0.25	0.3	74.8	0.85	57	59	70	0.3	76	2.3	0.9	0.083
	80	13	1	15.96	13.25	8,200	4,300	9,600	61911	1000911	2.1	1.3	77.9	0.4	0.5	84.4	0.12	60	61.5	75	1	86	2.9	1.2	0.180
	90	11	0.6	19.40	16.30	7,700	—	9,000	16011	7000111	—	—	—	—	—	—	—	59	—	86	0.6	—	—	—	0.258
	90	18	1.1	30.90	22.40	7,700	4,500	9,000	6011	111	2.87	2.7	86.79	0.6	0.5	96.5	2.46	61.5	64	83.5	1	98	5	2.5	0.388
	100	21	1.5	43.40	29.20	6,400	4,300	7,600	6211	211	3.28	2.7	96.8	0.6	0.5	106.5	2.46	63	67	92	1.5	108	5.4	2.5	0.601
	120	29	2	71.50	44.60	5,800	3,900	6,800	6311	311	4.06	3.1	115.21	0.6	0.5	129.7	2.82	64	74	111	2	131.5	6.5	2.9	1.370
	140	33	2.1	100.70	62.50	5,200	—	6,100	6411	411	—	—	—	—	—	—	—	66	—	129	2	—	—	—	2.290
60	78	10	0.3	9.10	8.70	8,000	4,400	9,400	61812	1000812	1.7	1.3	76.2	0.4	0.3	82.7	1.12	62	64.5	76	0.3	84	2.5	1.2	0.106
	85	13	1	28.70	17.20	7,600	4,300	8,900	61912	1000912	2.1	1.3	82.9	0.4	0.5	89.4	1.12	65	66.5	80	1	91	2.9	1.2	0.193
	95	11	0.6	19.90	17.50	7,000	—	8,300	16012	7000112	—	—	—	—	—	—	—	64	—	91	0.6	—	—	—	0.283
	95	18	1.1	30.70	22.70	7,000	4,100	8,300	6012	112	2.87	2.7	91.82	0.6	0.5	101.6	2.46	66.5	69	88.5	1	103	5	2.5	0.414
	110	22	1.5	52.40	35.90	6,000	3,800	7,000	6212	212	3.28	2.7	106.81	0.6	0.5	116.6	2.46	68	75	102	1.5	118	5.4	2.5	0.783
	130	31	2.1	81.80	51.80	5,400	3,600	6,300	6312	312	4.06	3.1	125.22	0.6	0.5	139.7	2.82	71	80.5	119	2	141.5	6.5	2.9	1.730
	150	35	2.1	102.00	64.50	4,800	—	5,700	6412	412	—	—	—	—	—	—	—	71	—	139	2	—	—	—	2.770





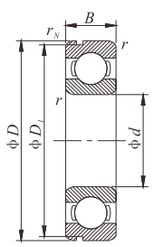
Open type

Shielded type
Z

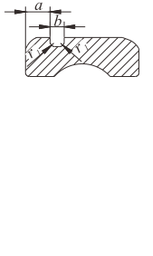


Non-contact seal type
RZ

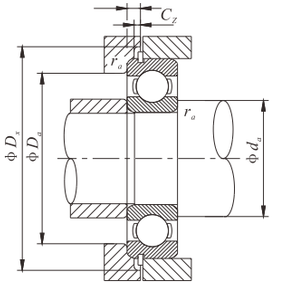
Contact seal type
RS



With snap ring groove

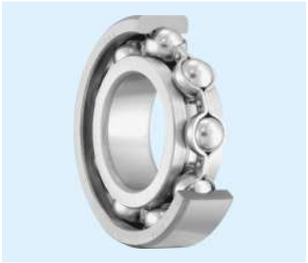


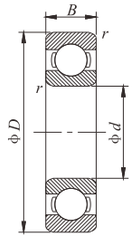
With snap ring



d 65~80 mm

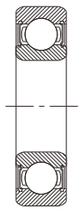
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds(r/min)			Nominal numbers	Nominal numbers (old)	Dimension of snap ring groove (mm)					Dimension of snap ring(mm)		Mounting dimensions (mm)							Reference mass (kg)
						Grease		Oil																	
d	D	B	r (Min)	C_r	C_{0r}	Non-contact type	Contact type	Open			a Max	b Min	D_1 Max	r_1 Max	r_N Min	D_2 Max	f Max	d_a Min	d_a Max	D_a Max	r_a Max	D_X Min	C_y Max	C_z Max	
65	85	10	0.6	11.90	11.50	7400	4100	8700	**61813**	**1000813**	1.7	1.3	82.9	0.4	0.5	89.4	1.12	69	70	81	0.6	91	2.5	1.2	0.128
	90	13	1	17.40	16.10	7000	4000	8200	**61913**	**1000913**	2.1	1.3	87.9	0.4	0.5	94.4	1.12	70	71.5	85	1	96	2.9	1.2	0.206
	100	11	0.6	20.50	18.70	6500	—	7700	**16013**	**7000113**	—	—	—	—	—	—	—	69	—	96	0.6	—	—	—	0.307
	100	18	1.1	29.20	23.50	6500	3900	7700	**6013**	**113**	2.87	2.7	96.8	0.6	0.5	106.5	2.46	71.5	74	93.5	1	108	5	2.5	0.421
	120	23	1.5	57.20	40.00	5500	3600	6500	**6213**	**213**	4.06	3.1	115.21	0.6	0.5	129.7	2.82	73	80.5	112	1.5	131.5	6.5	2.9	0.990
	140	33	2.1	92.70	59.80	4900	3300	5800	**6313**	**313**	4.9	3.1	135.23	0.6	0.5	149.7	2.82	76	86	129	2	152	7.3	2.9	2.080
	160	37	2.1	111.00	72.50	4400	—	5200	**6413**	**413**	—	—	—	—	—	—	—	76	—	149	2	—	—	—	3.300
70	90	10	0.6	12.20	11.90	6900	3800	8100	**61814**	**1000814**	1.7	1.3	87.9	0.4	0.5	94.4	1.12	74	75.5	86	0.6	96	2.5	1.2	0.137
	100	16	1	23.70	21.10	6500	3700	7700	**61914**	**1000914**	2.5	1.3	97.9	0.4	0.5	104.4	1.12	75	77.5	95	1	106	3.3	1.2	0.334
	110	13	0.6	26.80	23.60	6100	—	7100	**16014**	**7000114**	—	—	—	—	—	—	—	74	—	106	0.6	—	—	—	0.441
	110	20	1.1	38.60	30.40	6100	3600	7100	**6014**	**114**	2.87	2.7	106.81	0.6	0.5	116.6	2.46	76.5	80.5	103.5	1	118	5	2.5	0.604
	125	24	1.5	62.20	44.00	5100	3400	6000	**6214**	**214**	4.06	3.1	120.22	0.6	0.5	134.7	2.82	78	85	117	1.5	136.5	6.5	2.9	1.070
	150	35	2.1	104.10	68.00	4600	3100	5400	**6314**	**314**	4.9	3.1	145.24	0.6	0.5	159.7	2.82	81	92.5	139	2	162	7.3	2.9	2.520
	180	42	3	128.00	89.50	4100	—	4800	**6414**	**414**	—	—	—	—	—	—	—	83	—	167	2.5	—	—	—	4.830
75	95	10	0.6	12.50	12.80	6400	3600	7600	**61815**	**1000815**	1.7	1.3	92.9	0.4	0.5	99.4	1.12	79	80	91	0.6	101	2.5	1.2	0.145
	105	16	1	24.30	22.50	6100	3500	7200	**61915**	**1000915**	2.5	1.3	102.6	0.4	0.5	110.7	1.12	80	82.5	100	1	112	3.3	1.2	0.353
	115	13	0.6	27.60	25.30	5700	—	6700	**16015**	**7000115**	—	—	—	—	—	—	—	79	—	111	0.6	—	—	—	0.464
	115	20	1.1	40.10	33.10	5700	3300	6700	**6015**	**115**	2.87	2.7	111.81	0.6	0.5	121.6	2.46	81.5	85.5	108.5	1	123	5	2.5	0.649
	130	25	1.5	66.20	49.30	4800	3200	5600	**6215**	**215**	4.06	3.1	125.22	0.6	0.5	139.7	2.82	83	90.5	122	1.5	141.5	6.5	2.9	1.180
	160	37	2.1	114.00	76.50	4300	2900	5000	**6315**	**315**	4.9	3.1	155.22	0.6	0.5	169.7	2.82	86	99	149	2	172	7.3	2.9	3.020
	190	45	3	153.20	113.70	3800	—	4500	**6415**	**415**	—	—	—	—	—	—	—	88	—	177	2.5	—	—	—	5.720
80	100	10	0.6	12.60	12.70	6000	3400	7100	**61816**	**1000816**	1.7	1.3	97.9	0.4	0.5	104.4	1.12	84	85	96	0.6	106	2.5	1.2	0.154
	110	16	1	25.00	23.90	5700	3200	6700	**61916**	**1000916**	2.5	1.3	107.6	0.4	0.5	115.7	1.12	85	88	105	1	117	3.3	1.2	0.373
	125	14	0.6	31.90	29.60	5300	—	6200	**16016**	**7000116**	—	—	—	—	—	—	—	84	—	121	0.6	—	—	—	0.597
	125	22	1.1	47.50	39.80	5300	3100	6200	**6016**	**116**	2.87	3.1	120.22	0.6	0.5	134.7	2.82	86.5	91.5	118.5	1	136.5	5.3	2.9	0.854
	140	26	2	72.70	53.00	4500	3000	5300	**6216**	**216**	4.9	3.1	135.23	0.6	0.5	149.7	2.82	89	95.5	131	2	152	7.3	2.9	1.400
	170	39	2.1	90.40	89.60	4000	2700	4700	**6316**	**316**	5.69	3.5	163.65	0.6	0.5	182.9	3.1	91	105	159	2	185	8.4	3.1	3.590
	200	48	3	163.20	124.50	3600	—	4200	**6416**	**416**	—	—	—	—	—	—	—	93	—	187	2.5	—	—	—	6.760





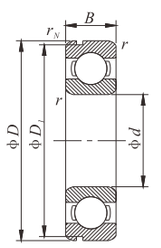
Open type

Shielded type
Z

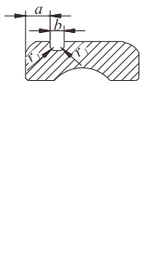


Non-contact seal type
RZ

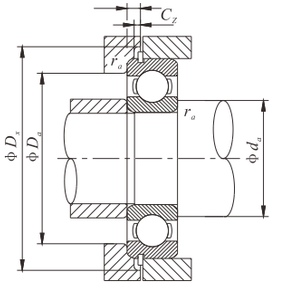
Contact seal type
RS



With snap ring groove

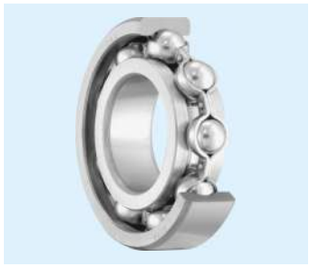


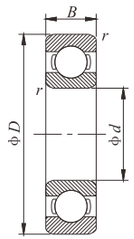
With snap ring



d **85~105 mm**

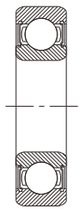
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds(r/min)			Nominal numbers	Nominal numbers (old)	Dimension of snap ring groove (mm)					Dimension of snap ring(mm)		Mounting dimensions (mm)							Reference mass (kg)
						Grease		Oil																	
d	D	B	r (Min)	C_r	C_{0r}	Non-contact type	Contact type	Open			a Max	b Min	D_1 Max	r_1 Max	r_N Min	D_2 Max	f Max	d_a Min	d_a Max	D_a Max	r_a Max	D_X Min	C_y Max	C_z Max	
85	110	13	1	19.80	19.20	5700	3100	6700	**61817**	**1000817**	2.1	1.3	107.6	0.4	0.5	115.7	1.12	90	91	105	1	117	2.9	1.2	0.270
	120	18	1.1	31.90	29.70	5400	3000	6300	**61917**	**1000917**	3.3	1.3	117.6	0.4	0.5	125.7	1.12	91.5	94	113.5	1	127	4.1	1.2	0.536
	130	14	0.6	32.80	31.50	5000	—	5900	**16017**	**7000117**	—	—	—	—	—	—	—	89	—	126	0.6	—	—	—	0.626
	130	22	1.1	52.80	44.50	5000	2900	5900	**6017**	**117**	2.87	3.1	125.22	0.6	0.5	139.7	2.82	91.5	97	123.5	1	141.5	5.3	2.9	0.890
	150	28	2	83.30	63.80	4200	2800	5000	**6217**	**217**	4.9	3.1	145.24	0.6	0.5	159.7	2.82	94	103	141	2	162	7.3	2.9	1.790
	180	41	3	132.70	96.60	3800	2600	4500	**6317**	**317**	5.69	3.5	173.66	0.6	0.5	192.9	3.1	98	112	167	2.5	195	8.4	3.1	4.230
90	115	13	1	19.00	19.70	5400	3000	6300	**61818**	**1000818**	2.1	1.3	112.6	0.4	0.5	120.7	1.12	95	96	110	1	122	2.9	1.2	0.285
	125	18	1.1	32.80	31.50	5100	2900	6000	**61918**	**1000918**	3.3	1.3	122.6	0.4	0.5	130.7	1.12	96.5	99	118.5	1	132	4.1	1.2	0.554
	140	16	1	41.50	39.30	4700	—	5600	**16018**	**7000118**	—	—	—	—	—	—	—	95	—	135	1	—	—	—	0.848
	140	24	1.5	61.20	50.60	4700	2800	5600	**6018**	**118**	3.71	3.1	135.23	0.6	0.5	149.7	2.82	98	102	132	1.5	152	6.1	2.9	1.020
	160	30	2	96.00	71.50	4000	2600	4700	**6218**	**218**	4.9	3.1	155.22	0.6	0.5	169.7	2.82	99	109	151	2	172	7.3	2.9	2.150
	190	43	3	142.60	107.20	3600	2400	4200	**6318**	**318**	5.69	3.5	183.64	0.6	0.5	202.9	3.1	103	118	177	2.5	205	8.4	3.1	4.910
95	120	13	1	20.80	19.80	5000	2800	5900	**61819**	**1000819**	2.1	1.3	117.6	0.4	0.5	125.7	1.12	100	101	115	1	127	2.9	1.2	0.300
	130	18	1.1	33.70	33.40	4800	2800	5700	**61919**	**1000919**	3.3	1.3	127.6	0.4	0.5	135.7	1.12	101.5	104	123.5	1	137	4.1	1.2	0.579
	145	16	1	42.70	41.90	4500	—	5300	**16019**	**7000119**	—	—	—	—	—	—	—	100	—	140	1	—	—	—	0.885
	145	24	1.5	60.80	51.00	4500	2600	5300	**6019**	**119**	3.71	3.1	140.23	0.6	0.5	154.7	2.82	103	109	137	1.5	157	6.1	2.9	1.080
	170	32	2.1	109.00	82.00	3700	2500	4400	**6219**	**219**	5.69	3.5	163.65	0.6	0.5	182.9	3.1	106	116	159	2	185	8.4	3.1	2.620
	200	45	3	156.60	121.80	3300	2300	3900	**6319**	**319**	5.69	3.5	193.65	0.6	0.5	212.9	3.1	108	125	187	2.5	215	8.4	3.1	5.670
100	125	13	1	20.10	22.00	4800	2700	5600	**61820**	**1000820**	2.1	1.3	122.6	0.4	0.5	130.7	1.12	105	106	120	1	132	2.9	1.2	0.313
	140	20	1.1	42.70	41.90	4500	2600	5300	**61920**	**1000920**	3.3	1.9	137.6	0.6	0.5	145.7	1.7	106.5	110	133.5	1	147	4.7	1.7	0.785
	150	16	1	43.80	44.30	4200	—	5000	**16020**	**7000120**	—	—	—	—	—	—	—	105	—	145	1	—	—	—	0.910
	150	24	1.5	60.20	54.20	4200	2600	5000	**6020**	**120**	3.71	3.1	145.24	0.6	0.5	159.7	2.82	108	110	142	1.5	162	6.1	2.9	1.150
	180	34	2.1	122.00	92.70	3500	2300	4200	**6220**	**220**	5.69	3.5	173.66	0.6	0.5	192.9	3.1	111	122	169	2	195	8.4	3.1	3.140
	215	47	3	173.00	140.20	3200	2200	3700	**6320**	**320**	—	—	—	—	—	—	—	113	133	202	2.5	—	—	—	7.000
105	130	13	1	19.80	22.00	4600	—	5400	**61821**	**1000821**	2.1	1.3	127.6	0.4	0.5	135.7	1.12	110	—	125	1	137	2.9	1.2	0.330
	145	20	1.1	42.50	42.00	4300	2500	5100	**61921**	**1000921**	3.3	1.9	142.6	0.6	0.5	150.7	1.7	111.5	115	138.5	1	152	4.7	1.7	0.816
	160	18	1	51.80	50.60	4000	—	4700	**16021**	**7000121**	—	—	—	—	—	—	—	110	—	155	1	—	—	—	1.200
	160	26	2	69.20	61.20	4000	2400	4700	**6021**	**121**	3.71	3.1	155.22	0.6	0.5	169.7	2.82	114	119	151	2	172	6.1	2.9	1.590
	190	36	2.1	133.00	105.00	3400	2300	4000	**6221**	**221**	5.69	3.5	183.64	0.6	0.5	202.9	3.1	116	125	179	2	205	8.4	3.1	3.700
	225	49	3	183.70	153.10	3000	2100	3600	**6321**	**321**	—	—	—	—	—	—	—	118	134	212	2.5	—	—	—	8.050





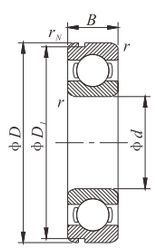
Open type

Shielded type
Z

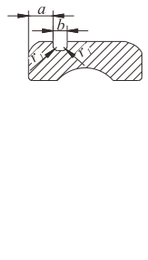


Non-contact seal type
RZ

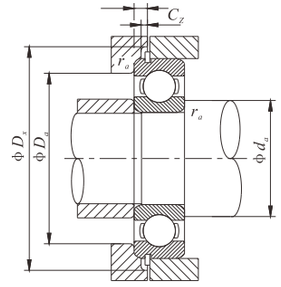
Contact seal type
RS



With snap ring groove

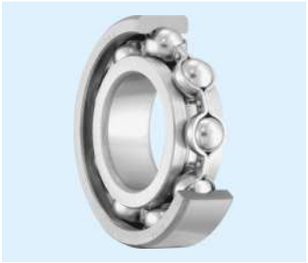


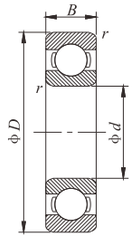
With snap ring



d 110~120 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds(r/min)			Nominal numbers	Nominal numbers (old)	Dimension of snap ring groove (mm)					Dimension of snap ring(mm)		Mounting dimensions (mm)							Reference mass (kg)
						Grease		Oil																	
d	D	B	r (Min)	C_r	C_{0r}	Non-contact type	Contact type	Open			a Max	b Min	D_1 Max	r_1 Max	r_N Min	D_2 Max	f Max	d_a Min	d_a Max	D_a Max	r_a Max	D_X Min	C_y Max	C_z Max	
110	140	16	1	28.10	30.70	4300	—	5100	61822	1000822	2.5	1.9	137.6	0.6	0.5	145.7	1.7	115	—	135	1	147	3.9	1.7	0.515
	150	20	1.1	43.50	44.50	4100	2400	4800	61922	1000922	3.3	1.9	147.6	0.6	0.5	155.7	1.7	116.5	120	143.5	1	157	4.7	1.7	0.849
	170	19	1	57.40	56.70	3800	—	4500	16022	7000122	—	—	—	—	—	—	—	115	—	165	—	—	—	—	1.460
	170	28	2	82.00	73.00	3800	2300	4500	6022	122	3.71	3.5	163.65	0.6	0.5	182.9	3.1	119	126	161	2	185	6.4	3.1	1.960
	200	38	2.1	144.00	117.00	3200	2200	3800	6222	222	5.69	3.5	193.65	0.6	0.5	212.9	3.1	121	132	189	2	215	8.4	3.1	4.360
	240	50	3	205.00	178.30	2900	1900	3400	6322	322	—	—	—	—	—	—	—	123	149	227	2.5	—	—	—	9.540
120	150	16	1	28.90	32.10	4000	—	4700	61824	1000824	2.5	1.9	147.6	0.6	0.5	155.7	1.7	125	—	145	1	157	3.9	1.7	0.555
	165	22	1.1	53.00	53.90	3800	—	4400	61924	1000924	3.7	1.9	161.8	0.6	0.5	171.5	1.7	126.5	—	158.5	1	173	5.1	1.7	1.150
	180	19	1	58.80	60.40	3500	—	4100	16024	7000124	—	—	—	—	—	—	—	125	—	175	1	—	—	—	1.560
	180	28	2	88.10	79.70	3500	2100	4100	6024	124	3.71	3.5	173.66	0.6	0.5	192.9	3.1	129	136	171	2	195	6.4	3.1	2.070
	215	40	2.1	155.30	131.00	2900	2000	3400	6224	224	—	—	—	—	—	—	—	131	143	204	2	—	—	—	5.150
	260	55	3	227.60	207.40	2600	—	3100	6324	324	—	—	—	—	—	—	—	133	—	247	2.5	—	—	—	12.40

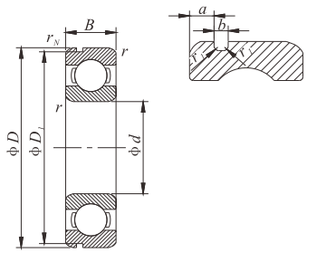




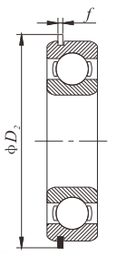
Open type

Shielded type
ZZ

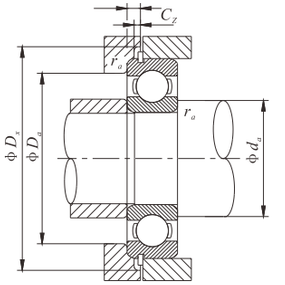
Contact seal type
2RS



With snap ring groove

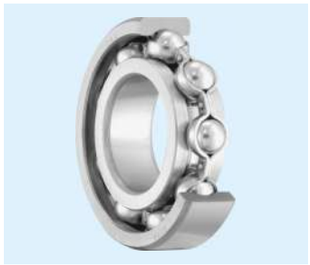


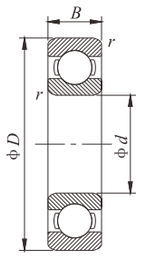
With snap ring

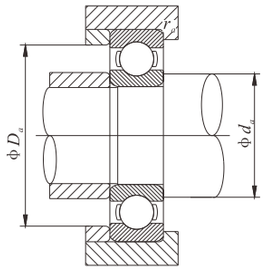


d 130~170 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Dimension of snap ring groove (mm)					Dimension of snap ring(mm)		Mounting dimensions (mm)							Reference mass (kg)
						Grease	Oil																	
d	D	B	r (Min)	C_r	C_{0r}	ZZ	Open			a Max	b Min	D_1 Max	r_1 Max	r_N Min	D_2 Max	f Max	d_a Min	d_a Max	D_a Max	r_a Max	D_X Min	C_y Max	C_z Max	
130	165	18	1.1	37.9	42.9	3600	4300	**61826**	**1000826**	3.3	1.9	161.8	0.6	0.5	171.5	1.7	136.5	—	158.5	1	173	4.7	1.7	0.800
	180	24	1.5	65.1	67.2	3400	4000	**61926**	**1000926**	3.7	1.9	176.8	0.6	0.5	186.5	1.7	138	—	172	1.5	188	5.1	1.7	1.520
	200	22	1.1	80.0	79.5	3200	3800	**16026**	**7000126**	—	—	—	—	—	—	—	136.5	—	193.5	1	—	—	—	2.310
	200	33	2	105.0	96.8	3200	3800	**6026**	**126**	5.69	3.5	193.65	0.6	0.5	212.9	3.1	139	148	191	2	215	8.4	3.1	3.160
	230	40	3	165.0	148.0	2600	3200	**6226**	**226**	—	—	—	—	—	—	—	143	—	217	2.5	—	—	—	5.820
	280	58	4	250.9	238.7	2200	2800	**6326**	**326**	—	—	—	—	—	—	—	146	—	264	3	—	—	—	15.30
140	175	18	1.1	38.2	44.3	3400	4000	**61828**	**1000828**	3.3	1.9	171.8	0.6	0.5	181.5	1.7	146.5	—	168.5	1	183	4.7	1.7	0.850
	190	24	1.5	66.5	71.5	3200	3800	**61928**	**1000928**	3.7	1.9	186.8	0.6	0.5	196.5	1.7	148	—	182	1.5	198	5.1	1.7	1.620
	210	22	1.1	82.1	85.0	3000	3600	**16028**	**7000128**	—	—	—	—	—	—	—	146.5	—	203.5	1	—	—	—	2.450
	210	33	2	105.4	101.8	3000	3600	**6028**	**128**	—	—	—	—	—	—	—	149	158	201	2	—	—	—	3.350
	250	42	3	166.0	150.0	2400	3000	**6228**	**228**	—	—	—	—	—	—	—	153	—	237	2.5	—	—	—	7.570
	300	62	4	211.4	254.0	2000	2600	**6328**	**328**	—	—	—	—	—	—	—	156	—	284	3	—	—	—	18.50
150	190	20	1.1	47.5	55.0	3000	3600	**61830**	**1000830**	3.3	1.9	186.8	0.6	0.5	196.5	1.7	156.5	—	183.5	1	198	4.7	1.7	1.160
	210	28	2	84.7	90.2	2800	3400	**61930**	**100930**	—	—	—	—	—	—	—	159	—	201	2	—	—	—	2.470
	225	24	1.1	91.8	98.5	2600	3200	**16030**	**7000130**	—	—	—	—	—	—	—	156.5	—	218.5	1	—	—	—	3.070
	225	35	2.1	131.7	124.5	2600	3200	**6030**	**130**	—	—	—	—	—	—	—	161	169	214	2	—	—	—	4.080
	270	45	3	176.0	168.0	2000	2600	**6230**	**230**	—	—	—	—	—	—	—	163	—	257	2.5	—	—	—	9.410
	320	65	4	221.6	270.0	1900	2400	**6330**	**330**	—	—	—	—	—	—	—	166	—	304	3	—	—	—	22.00
160	200	20	1.1	49.6	59.1	2800	3400	**61832**	**1000832**	3.3	1.9	196.8	0.6	0.5	206.5	1.7	166.5	—	193.5	1	208	4.7	1.7	1.230
	220	28	2	86.9	95.5	2600	3200	**61932**	**1000932**	—	—	—	—	—	—	—	169	—	211	2	—	—	—	2.610
	240	25	1.5	99.0	108.0	2400	3000	**16032**	**7000132**	—	—	—	—	—	—	—	168	—	232	1.5	—	—	—	3.640
	240	38	2.1	136.6	135.4	2400	3000	**6032**	**132**	—	—	—	—	—	—	—	171	183	229	2	—	—	—	5.050
	290	48	3	215.0	218.0	1900	2400	**6232**	**232**	—	—	—	—	—	—	—	173	—	277	2.5	—	—	—	11.70
	340	68	4	301.0	317.0	1800	2200	**6332**	**332**	—	—	—	—	—	—	—	176	—	324	3	—	—	—	26.00
170	215	22	1.1	59.8	70.4	2600	3200	**61834**	**1000834**	—	—	—	—	—	—	—	176.5	—	208.5	1	—	—	—	1.630
	230	28	2	86.0	95.5	2400	3000	**61934**	**1000934**	—	—	—	—	—	—	—	179	—	221	2	—	—	—	2.740
	260	28	1.5	119.0	128.0	2200	2800	**16034**	**7000134**	—	—	—	—	—	—	—	178	—	252	1.5	—	—	—	4.930
	260	42	2.1	168.0	172.0	2200	2800	**6034**	**134**	—	—	—	—	—	—	—	181	—	249	2	—	—	—	6.760
	310	52	4	212.0	223.0	1900	2400	**6234**	**234**	—	—	—	—	—	—	—	186	—	294	3	—	—	—	14.50
	360	72	4	335.5	378.1	1700	2000	**6334**	**334**	—	—	—	—	—	—	—	186	—	344	3	—	—	—	30.70

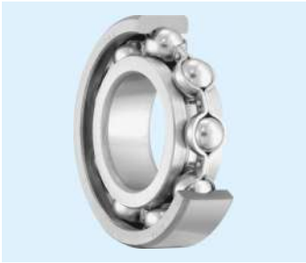


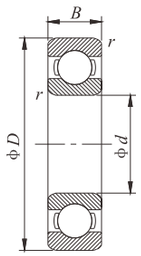


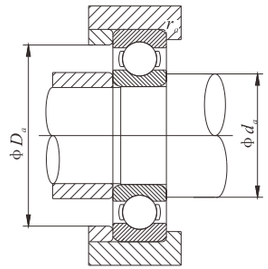


d 180~200 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)		Mounting dimensions (mm)			Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	
180	225	22	1.1	60.5	73.0	2400	3000	61836	1000836		186.5	218.5	1	2.030
	250	33	2	110.0	119.0	2200	2800	61936	1000936		189	241	2	4.760
	280	31	2	188.9	198.7	2000	2600	16036	7000136		189	271	2	6.490
	280	46	2.1	189.0	199.0	2000	2600	6036	136		191	269	2	8.800
	320	52	4	227.0	241.0	1800	2200	6236	236		196	304	3	15.10
	380	75	4	355.0	405.0	1600	2000	6336	336		196	364	3	35.60
190	240	24	1.5	73.0	88.0	2200	2800	61838	1000838		198	232	1.5	2.620
	260	33	2	117	133	2200	2800	61938	1000939		199	251	2	4.980
	290	31	2	145.5	160.0	2000	2600	16038	7000138		199	281	2	6.770
	290	46	2.1	172.0	187.0	2000	2600	6038	138		201	279	2	9.180
	340	55	4	255.0	281.0	1700	2000	6238	238		206	324	3	18.20
	400	78	5	378.0	439.0	1600	1900	6338	338		210	380	4	41.00
200	250	24	1.5	74.0	91.5	2200	2800	61840	1000840		208	242	1.5	2.730
	280	38	2.1	149	168.0	2000	2600	61940	1000940		211	269	2	7.100
	310	34	2	167	191	1900	2400	16040	7000140		209	301	2	8.680
	310	51	2.1	218.0	243.0	1900	2400	6040	140		211	299	2	11.90
	360	58	4	269.0	310.0	1700	2000	6240	240		216	344	3	21.60
	420	80	5	410.0	500.0	1500	1800	6340	340		220	400	4	46.30

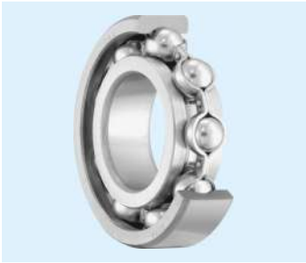


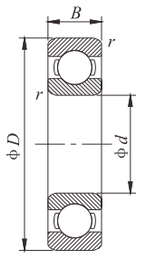


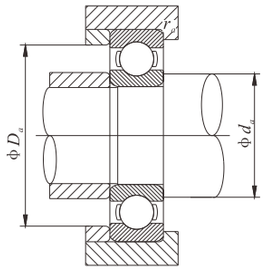


d 220~380mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Mounting dimensions (mm)			Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil		d_a Min	D_a Max	r_a Max	
220	270	24	1.5	78	110	1900	2400	**61844**	228	262	1.5	3
	300	38	2.1	151	180	1900	2400	**61944**	231	289	2	8
	340	37	2.1	174	204	1800	2200	**16044**	231	329	2	11.2
	340	56	3	247	290	1800	2200	**6044**	233	327	2.5	18.5
	400	65	4	296	365	1500	1800	**6244**	236	284	3	37
	460	88	5	410	520	1300	1600	**6344**	240	440	4	72.5
240	300	28	2	108	150	1800	2200	**61848**	249	291	2	4.5
	320	38	2.1	159	200	1800	2200	**61948**	251	309	2	8.6
	360	37	2.1	178	220	1700	2000	**16048**	251	349	2	14.5
	360	56	3	255	315	1700	2000	**6048**	253	347	2.3	19.5
	440	72	4	358	475	1300	1600	**6248**	256	424	3	51
260	320	28	2	111	163	1700	2000	**61852**	269	311	2	4.8
	360	46	2.1	212	270	1600	1900	**61952**	271	349	2	14.5
	400	44	3	238	310	1500	1800	**16052**	273	387	2.5	21.5
	400	65	4	291	375	1500	1800	**6052**	276	384	3	29.5
	480	80	5	390	530	1100	1400	**6252**	280	460	4	65.5
280	350	33	2	138	200	1600	1900	**61856**	289	341	2	7.4
	380	46	2.1	216	285	1500	1800	**61956**	291	169	2	15.5
	420	44	3	242	335	1400	1700	**16056**	293	407	2.3	23
	420	65	4	302	405	1400	1700	**6056**	296	404	3	31
	500	80	5	423	600	1100	1400	**6256**	300	480	4	71
300	380	38	2.1	172	245	1400	1700	**61060**	311	369	2	10.5
	420	56	3	270	375	1300	1600	**61960**	313	407	2.5	24.5
	460	50	4	286	405	1200	1500	**16060**	316	444	3	32
	460	74	4	358	500	1200	1500	**6060**	316	444	3	44
320	400	38	2.1	172	255	1300	1600	**61864**	331	389	2	11
	440	56	3	276	400	1200	1500	**61964**	333	427	2.5	25.5
	480	50	4	281	405	1100	1400	**16064**	336	464	3	34
	480	74	4	371	540	1100	1400	**6064**	336	464	3	46
340	420	38	2.1	178	275	1200	1500	**61868**	351	409	2	11.5
	460	56	3	281	425	1100	1400	**61968**	353	447	2.5	26.5
	520	57	5	346	520	1000	1300	**16068**	356	504	3	45
	520	82	6	423	640	1000	1300	**6068**	360	500	4	62
360	440	38	2.1	182	285	1100	1400	**61872**	371	429	2	12
	480	56	3	291	450	1100	1400	**61972**	373	467	2.5	28
	540	57	5	351	550	1000	1300	**16072**	376	524	3	49
	540	82	6	462	735	1000	1300	**6072**	380	520	4	64.5
380	480	46	2.1	242	390	1000	1300	**61876**	391	469	2	20
	520	65	4	338	540	1000	1300	**61976**	396	504	3	40
	560	57	5	377	620	950	1200	**16076**	396	544	3	51
	560	82	5	462	750	950	1200	**6076**	400	540	4	67.5



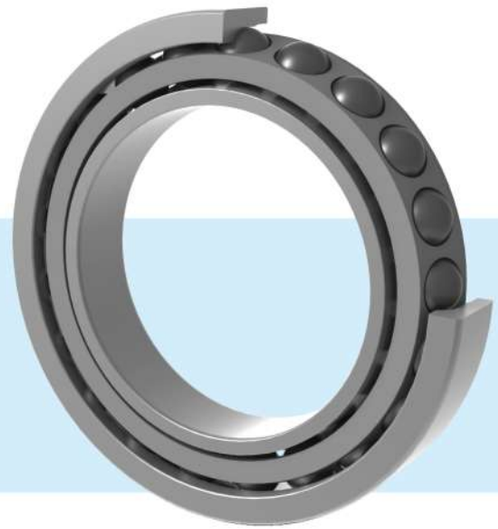




d **400~1000mm**

d	Boundary dimensions (mm) D	B	r (Min)	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Grease	Oil	Nominal numbers	Mounting dimensions (mm) d_a Min	D_a Max	r_a Max	Reference mass (kg)
400	500	46	2.1	247	405	1000	1000	**61880**	411	489	2	20.5
	540	65	4	345	570	950	950	**61980**	416	524	3	41.5
	600	90	5	520	865	900	900	**6080**	420	580	4	87.5
420	520	46	2.1	251	425	950	1200	**61884**	431	509	2	21.5
	560	65	4	351	600	900	1100	**61984**	436	544	3	43
	620	90	5	507	880	900	1100	**6084**	440	600	4	91.5
440	540	46	2.1	255	440	900	1100	**61888**	451	529	2	22.5
	600	74	4	410	720	900	1100	**61988**	456	584	3	60.5
	650	94	6	553	965	850	1000	**6088**	466	624	5	105
460	580	56	3	319	570	900	1100	**61892**	473	567	2.5	35
	620	74	4	423	750	650	1000	**61992**	476	604	3	62.5
	680	100	6	582	1,060	800	950	**6092**	486	654	5	120
480	600	56	3	325	600	850	1000	**61896**	493	587	2.5	36.5
	650	78	5	449	815	800	950	**61996**	500	630	4	74
	700	100	6	618	1,140	750	900	**6096**	506	674	5	125
500	620	56	3	332	620	800	950	**618/500**	513	607	2.5	37.5
	670	78	5	452	865	750	900	**619/500**	520	650	4	77
	720	100	6	605	1,140	750	900	**60/500**	526	694	5	135
530	650	56	3	332	655	750	900	**618/530**	543	637	2.5	39.5
	710	82	5	488	930	700	850	**619/530**	550	690	4	90.5
	780	112	6	650	1,270	670	800	**60/530**	556	754	5	185
560	680	56	3	345	695	700	850	**618/560**	573	667	2.5	42
	750	85	5	494	980	670	800	**619/560**	580	730	4	105
	820	115	6	663	1,470	630	750	**60/560**	586	794	5	210
600	730	60	3	364	765	670	800	**618/600**	613	717	2.5	52
	800	90	5	585	1,220	630	750	**619/600**	620	780	4	125
630	780	69	4	442	965	630	750	**618/630**	646	764	3	73
	850	110	6	624	1,340	600	700	**619/630**	656	824	5	160
	920	128	7.5	819	1,760	560	670	**60/630**	663	887	6	285
670	820	69	4	442	1,000	560	670	**618/670**	686	804	3	77.5
	900	103	6	676	1,500	530	630	**619/670**	696	874	5	185
	980	136	7.5	904	2,040	500	600	**60/670**	703	947	6	345
710	870	74	4	475	1,100	530	630	**618/710**	726	854	3	93.5
	950	106	6	663	1,500	500	600	**619/710**	736	924	5	220
	1030	140	7.5	956	2,200	560	560	**60/710**	743	997	6	375
750	920	78	5	527	1,250	500	600	**618/750**	770	900	4	110
	1000	112	6	761	1,800	480	560	**619/750**	776	974	5	255
800	980	82	5	559	1,370	450	530	**618/800**	820	960	4	130
850	1030	82	5	559	1,430	430	500	**618/850**	870	1010	4	140
900	1090	85	5	618	1,600	380	450	**618/900**	920	1070	4	160
1000	1220	100	6	637	1,800	340	400	**618/1000**	1026	1194	5	245

Angular contact ball bearing



Angular contact ball bearing

Angular contact ball bearing

Angular contact ball bearings can take radial load and axial load simultaneously. Single row angular contact ball bearings can only take single direction axial load, so angular contact ball bearings are often used in pairs. The paired angular contact ball bearings with manufactured clearance are the most convenient. The contact angles between steel balls and the inner ring/outer ring fall into 15°, 25° and 40 °. The larger the contact angle is, the higher axial load it can take. The smaller the contact angle is, the higher rotation speed. Generally, contact angel of 15° is applied to high precision and high speed bearings.

1. Single row angular contact ball bearing

This type of bearing is designed with a certain contact angle, so they are suited to take single direction axial load or combined load. Structurally, axial thrust load will be generated after taking radial load, so angular contact ball bearings are often used in pairs, or more than two sets matched. The rigidity of single row angular contact ball bearings can be improved through preloading. Therefore, they are applied to the spindles of machine tools with high rotating precision.

The contact angles of standard products including 15°, 25°, 40°. The cages of bearings with 15° and 25° contact angles are often made of plastic. The materials of the cages of bearing with 40° contact angle are made of copper, nylon, steel sheet, etc.

In addition, the quantity of the steel balls may also vary with the structure of the cage even for the same type; accordingly the load ratings are also different from the values specified in the specification table.

For angular contact ball bearings with contact angles of 15° and 25°, products with high precision of class P4 of higher are available.

These products are especially suitable for the spindles of high speed and precision machine tools and spinning machines.

2. Matched pair angular contact ball bearing

The structures and features of matched pair angular contact ball bearings are shown in Table 1.

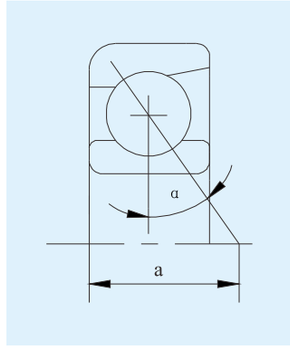
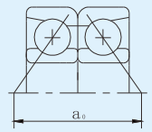
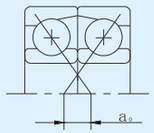
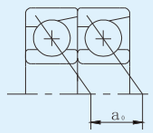


Table 1 The structures and features of matched pair angular contact ball bearings

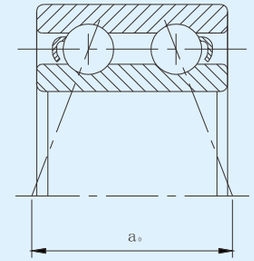
Sketch	Structures	Features
	Back to back matched pair DB E.g: 7209 CDB	Capable of taking radial load and axial load in double direction. The application point distance a_0 is large, so they are applicable for situations where require large torque load.
	Face to face matched pair DF E.g: 7209 BDF	Capable of taking radial load and axial load in double direction. Compared with back to back matched pair type, the application point distance is smaller, so the torque load capacity is limited.
	Tandem matched pair DT E.g: 7209 CDT	Capable of carrying radial load and single-direction axial load. This type carries axial load in pairs and is used to situations with a large unidirectional load.

Note: The value of the application point a_0 is not provided in the specification table. Please contact the technical center of C&U Group if needed.

3. Double-row angular contact ball bearings

The inner and outer rings of the back-to-back matched bearings are combined into one structure, which can take two directional axial loads, and has large offset load capability. They can be used as fixed end bearings.

Pressed cages or nylon cages are normally used.

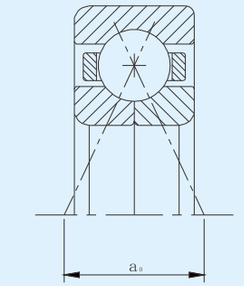


4. Four-point contact ball bearing

Four-point contact ball bearings are normally composed of an inner ring and two pieces of half outer rings or an outer ring and two pieces of half inner rings, which can take axial loads in both directions.

When contact angle is 35°, the large axial load capacity makes it suitable to take pure axial load, or combined load with large axial load.

Machined cages made of copper alloy are often used.



5. Magnetic clutch bearings for automobile compressors

Magnetic clutch bearings for automobile compressors are dedicated products designed and manufactured according to the mounting dimensions and working conditions provided by customers. This kind of bearing is similar to a double row radial ball bearing in structure, but double-row ball bearings for magnetic clutches have the following advantages:

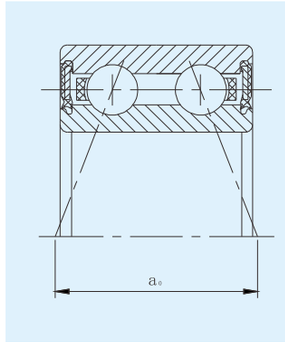
● High temperature resistance, high rotation speed and high reliability

Since double row ball bearings for magnetic clutches of air conditioner works at high temperature for a long time near the engine, special heat treatment process and high performance grease are adopted by C&U to ensure high temperature performance.

● Excellent sealing performance

With the severe working environment and the long term exposure to dust contamination and water vapor, the requirements of this working environment are met completely by means of unique seal structure.

These products are featured by high precision and low-noise, and can be mass-produced for all sizes and specifications.



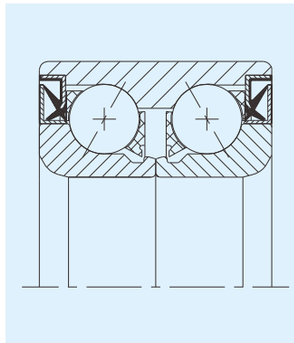
6. First generation wheel hub bearing

First generation wheel hub bearings are dedicated products designed and manufactured according to the mounting dimensions and working conditions provided by customers. Their features are as follows:

● High quality steel and fine lubricating grease make wheel hub bearings possess advantages such as large load rating, impact resistance, mud and slurry resistance, compact structure and light weight.

● Capable of taking relatively high axial load and radial load simultaneously

● Long life of the bearing can be ensured without adding lubricant at the time of installation.



7. Precautions for the application of angular contact ball bearings

In severe working conditions such as reaching the limit speed and limit temperature, or with little lubricant, or under high vibration and torque load, some bearings may not be suitable due to differences in cage design. In these cases, please contact C&U.

In addition, if the ratio between the axial load and radial load of the matched pair bearings exceeds the value of e due to excessively low load during operating(specified in the specification table), sliding will occur between the balls and the raceways, and scratches will result.

Large angular contact ball bearings with heavy balls and cages are particularly prone to this tendency. Please contact C&U if such load conditions are predicted in advance when selection.

8. Dimensional accuracy & running accuracy

Please refer to Section 5 for the dimensional and running accuracy for single row angular contact bearing, double row angular contact ball bearing, and four-point contact ball bearing.

Regarding the dimensional accuracy and running accuracy of bearings for magnetic clutches and first generation wheel hub bearings, please contact C&U if needed.

9. Recommended fit

Please refer to Section 6 for the fit of single row angular contact bearing, double row angular contact ball bearing, and four-point contact ball bearing.

Regarding the fit of bearings for magnetic clutches and first generation wheel hub bearings for sedan, please contact C&U Group if needed.

10. Clearance

Matched pair bearings with precision higher than Class P5 are often used in spindles of machine tools with preloading. However, the internal clearance had been adjusted correspondingly during the manufacturing process to achieve light, medium, or heavy preload when installed. Furthermore, the fit is also special. For more information, please see Table 7.3.

Clearance (or preloading) of matched pair bearings can be obtained by using shims or other means to ensure that the faces of the rings of both bearings are in contact with each other.

Please refer to Section 6 for clearance of four-point contact ball bearing.

For the details of clearance of other types of bearings, please contact C&U.

11. Limit speed

The limit speed stated in the specification table is applicable to bearings with machined cage. Limit speed of the bearings with pressed cage are 80 % of this value. The limit speed of bearings with contact angles at 15 ° and 25 ° are the value of bearings with precision higher than Class P5 (with machined cage made of synthetic resin and formed cage made of polyamide). However, it is necessary to revise the limit rotation speed according to the load conditions. In addition, speed higher than the limit speed is also available by modifying the lubrication conditions. Please refer to Section 10 for details.

12. Single row angular contact ball bearing

Static equivalent load $P_0=X_0F_r+Y_0F_a$

Nominal contact angle	Single row or tandem arrangement		Back to back arrangement Face to face arrangement	
	X_0	Y_0	X_0	Y_0
15°	0.5	0.46	1	0.92
25°	0.5	0.38	1	0.76
40°	0.5	0.26	1	0.52

Note: For single row or tandem arrangement, when $P_0>0.5F_r+Y_0F_a$, $P_0=F_r$.

Dynamic equivalent load $P=XF_r+YF_a$

Nominal contact angle	$\frac{if_0F_a^*}{C_{0r}}$	e	Single row or tandem arrangement				Back to back arrangement or face to face arrangement			
			$F_a/F_r\leqslant e$		$F_a/F_r>e$		$F_a/F_r\leqslant e$		$F_a/F_r>e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.38
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.070	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.430	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.140	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.570	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.350	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	——	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
40°	——	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

Note: i=2 for back to back arrangement and face to face arrangement, and i=1 for tandem arrangement.

13.Double row angular contact ball bearing

Dynamic equivalent load $P=XF_r+YF_a$

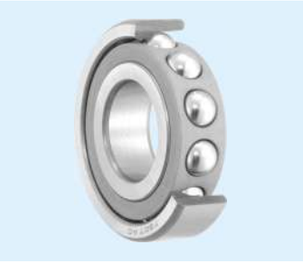
Static equivalent load $P=F_r+0.76F_a$

$F_a/F_r\leqslant e$		$F_a/F_r>e$		e
X	Y	X	Y	
1	0.92	0.67	1.41	0.68

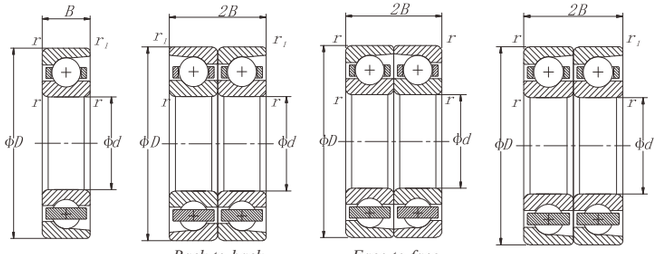
14.Four-point contact ball bearing

Dynamic equivalent load $P_a=F_a$

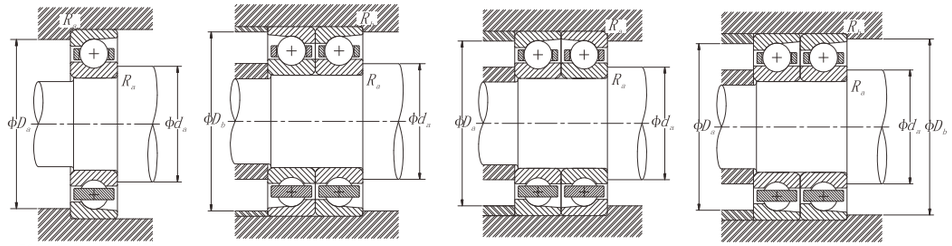
Static equivalent load $P_{0a}=F_a$



d 10~17 mm

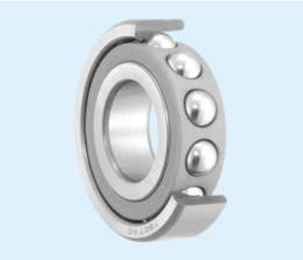


Single row | Back-to-back arrangement DB | Face-to-face arrangement DF | Tandem arrangement DT

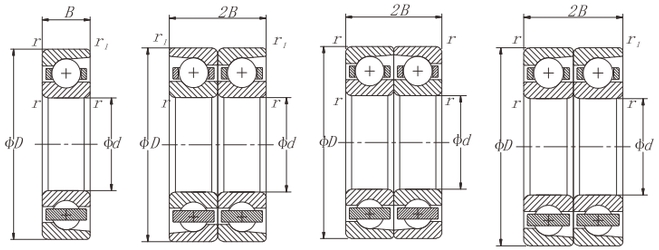


7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

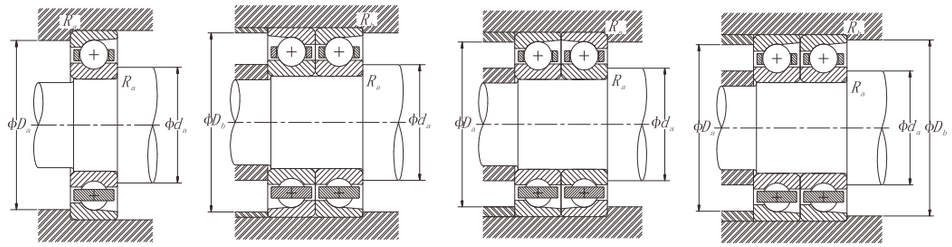
d	Boundary dimensions (mm) D	B	2B	r (Min)	r1 (Min)	Basic load ratings (kN) Cr	C0r	Limiting speeds (r/min) Grease	Oil	Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN) Cr	C0r	Limiting speeds (arrangement)(r/min) Grease	Oil	Nominal numbers Back-to-back	Face-to-face	Tandem	Mounting dimensions (mm) da Min	Da Max	Db Max	Ra Max	Rb Max	Reference mass (kg)
10	26	8	16	0.30	0.15	5.32	2.49	41,000	58,000	7000C	36100	8.62	4.98	34,800	46,400	7000CDB	7000CDF	7000CDT	12.5	23.5	24.5	0.3	0.15	0.023
	26	8	16	0.30	0.15	5.14	2.41	36,000	50,000	7000AC	46100	8.33	4.82	30,000	40,000	7000ACDB	7000ACDF	7000ACDT	12.5	23.5	24.5	0.3	0.15	0.023
	30	9	18	0.60	0.30	6.42	2.94	39,000	54,000	7200C	36200	10.40	5.88	32,400	43,200	7200CDB	7200CDF	7200CDT	15.0	25.0	27.5	0.6	0.3	0.029
	30	9	18	0.60	0.30	6.22	2.85	33,000	46,000	7200AC	46200	10.08	5.70	27,600	36,800	7200ACDB	7200ACDF	7200ACDT	15.0	25.0	27.5	0.6	0.3	0.029
	30	9	18	0.60	0.30	4.98	2.49	22,000	30,000	7200B	66200	8.07	4.98	18,000	24,000	7200BDB	7200BDF	7200BDT	15.0	25.0	27.5	0.6	0.3	0.029
	35	11	22	0.60	0.30	9.71	4.52	34,000	47,000	7300C	36300	15.73	9.04	28,200	37,600	7300CDB	7300CDF	7300CDT	15.0	30.0	32.5	0.6	0.3	0.039
	35	11	22	0.60	0.30	9.48	4.39	27,000	37,000	7300AC	46300	15.36	8.78	22,200	29,600	7300ACDB	7300ACDF	7300ACDT	15.0	30.0	32.5	0.6	0.3	0.040
	35	11	22	0.60	0.30	8.75	4.05	22,000	29,000	7300B	66300	14.18	8.10	17,400	23,200	7300BDB	7300BDF	7300BDT	15.0	30.0	32.5	0.6	0.3	0.041
12	28	8	16	0.30	0.15	5.80	2.90	37,000	52,500	7001C	36101	9.40	5.80	31,500	42,000	7001CDB	7001CDF	7001CDT	14.5	25.5	26.5	0.3	0.15	0.025
	28	8	16	0.30	0.15	5.58	2.79	32,000	45,000	7001AC	46101	9.04	5.58	27,000	36,000	7001ACDB	7001ACDF	7001ACDT	14.5	25.5	26.5	0.3	0.15	0.025
	32	10	20	0.60	0.30	7.92	3.84	35,000	49,000	7201C	36201	12.83	7.68	29,400	39,200	7201CDB	7201CDF	7201CDT	17.0	27.0	29.5	0.6	0.3	0.034
	32	10	20	0.60	0.30	7.66	3.73	30,000	42,000	7201AC	46201	12.41	7.46	25,200	33,600	7201ACDB	7201ACDF	7201ACDT	17.0	27.0	29.5	0.6	0.3	0.035
	32	10	20	0.60	0.30	7.43	4.31	20,000	27,000	7201B	66201	12.04	8.62	16,200	21,600	7201BDB	7201BDF	7201BDT	17.0	27.0	29.5	0.6	0.3	0.036
	37	12	24	1.00	0.60	9.97	4.75	31,000	43,000	7301C	36301	16.15	9.50	25,800	34,400	7301CDB	7301CDF	7301CDT	18.0	31.0	33.5	1.0	0.5	0.043
	37	12	24	1.00	0.60	9.69	4.59	25,000	34,000	7301AC	46301	15.70	9.18	20,400	27,200	7301ACDB	7301ACDF	7301ACDT	18.0	31.0	33.5	1.0	0.5	0.044
	37	12	24	1.00	0.60	8.84	4.19	19,000	26,000	7301B	66301	14.32	8.38	15,600	20,800	7301BDB	7301BDF	7301BDT	18.0	31.0	33.5	1.0	0.5	0.045
15	32	9	18	0.30	0.15	6.24	3.39	32,000	45,000	7002C	36102	10.11	6.78	27,000	36,000	7002CDB	7002CDF	7002CDT	17.5	29.5	30.5	0.3	0.15	0.035
	32	9	18	0.30	0.15	5.97	3.24	27,000	38,000	7002AC	46102	9.67	6.48	22,800	30,400	7002AC	7002ACDF	7002ACDT	17.5	29.5	30.5	0.3	0.15	0.035
	35	11	22	0.60	0.30	7.70	4.06	31,000	43,000	7202C	36202	12.47	8.12	25,800	34,400	7202CDB	7202CDF	7202CDT	20.0	30.0	32.5	0.6	0.3	0.045
	35	11	22	0.60	0.30	7.39	3.90	26,000	37,000	7202AC	46202	11.97	7.80	22,200	29,600	7202ACDB	7202ACDF	7202ACDT	20.0	30.0	32.5	0.6	0.3	0.046
	35	11	22	0.60	0.30	7.93	4.31	17,000	24,000	7202B	66202	12.85	8.62	14,400	19,200	7202BDB	7202BDF	7202BDT	20.0	30.0	32.5	0.6	0.3	0.047
	42	13	26	1.00	0.60	13.20	6.75	27,000	37,000	7302C	36302	21.38	13.50	22,200	29,600	7302CDB	7302CDF	7302CDT	21.0	36.0	38.5	1.0	0.5	0.055
	42	13	26	1.00	0.60	12.80	6.54	21,000	29,000	7302AC	46302	20.74	13.08	17,400	23,200	7302ACDB	7302ACDF	7302ACDT	21.0	36.0	38.5	1.0	0.5	0.056
	42	13	26	1.00	0.60	12.45	6.58	17,000	22,000	7302B	66302	20.17	13.16	13,200	17,600	7302BDB	7302BDF	7302BDT	21.0	36.0	38.5	1.0	0.5	0.057
17	35	10	20	0.30	0.15	6.61	3.81	28,000	40,000	7003C	36103	10.71	7.62	24,000	32,000	7003CDB	7003CDF	7003CDT	19.5	32.5	33.5	0.3	0.15	0.045
	35	10	20	0.30	0.15	6.30	3.65	25,000	35,000	7003AC	46103	10.21	7.30	21,000	28,000	7003ACDB	7003ACDF	7003ACDT	19.5	32.5	33.5	0.3	0.15	0.046
	40	12	24	0.60	0.30	10.90	5.82	27,000	38,000	7203C	36203	17.66	11.64	22,800	30,400	7203CDB	7203CDF	7203CDT	22.0	35.0	37.5	0.6	0.3	0.062
	40	12	24	0.60	0.30	10.50	5.61	23,000	32,000	7203AC	46203	17.01	11.22	19,200	25,600	7203ACDB	7203ACDF	7203ACDT	22.0	35.0	37.5	0.6	0.3	0.064



d 17~30 mm

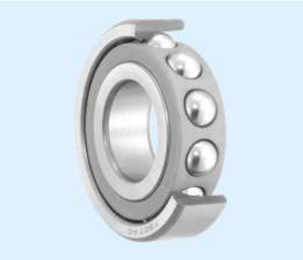


Single row | *Back-to-back arrangement DB* | *Face-to-face arrangement DF* | *Tandem arrangement DT*

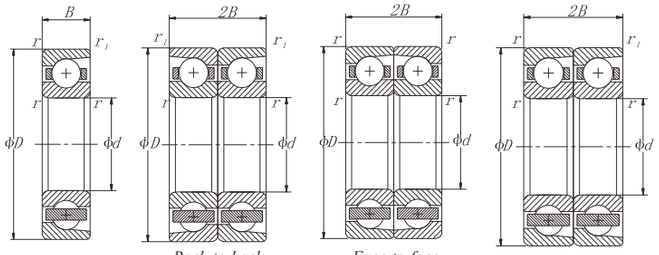


7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

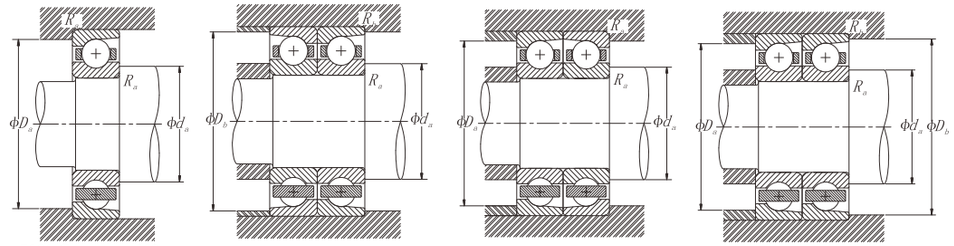
Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN)		Limiting speeds (arrangement)(r/min)		Nominal numbers			Mounting dimensions (mm)					Reference mass (kg)
d	D	B	2B	r (Min)	r_1 (Min)	C_r	C_{0r}	Grease	Oil			C_r	C_{0r}	Grease	Oil	Back-to-back	Face-to-face	Tandem	d_a Min	D_a Max	D_b Max	R_a Max	R_b Max	
17	40	12	24	0.60	0.30	9.93	5.54	15,000	21,000	7203B	66203	16.09	11.08	12,600	16,800	7203BDB	7203BDF	7203BDT	22.0	35.0	37.5	0.6	0.3	0.066
	47	14	28	1.00	0.60	15.70	8.24	24,000	33,000	7303C	36303	25.43	16.48	19,800	26,400	7303CDB	7303CDF	7303CDT	23.0	41.0	43.5	1.0	0.5	0.105
	47	14	28	1.00	0.60	15.20	7.99	19,000	27,000	7303AC	46303	24.62	15.98	16,200	21,600	7303ACDB	7303ACDF	7303ACDT	23.0	41.0	43.5	1.0	0.5	0.107
	47	14	28	1.00	0.60	14.80	8.02	15,000	20,000	7303B	66303	23.98	16.04	12,000	16,000	7303BDB	7303BDF	7303BDT	23.0	41.0	43.5	1.0	0.5	0.109
20	42	12	24	0.60	0.30	11.10	6.56	24,000	34,000	7004C	36104	17.98	13.12	20,400	27,200	7004CDB	7004CDF	7004CDT	25.0	37.0	39.5	0.6	0.3	0.079
	42	12	24	0.60	0.30	10.60	6.27	21,000	29,000	7004AC	46104	17.17	12.54	17,400	23,200	7004ACDB	7004ACDF	7004ACDT	25.0	37.0	39.5	0.6	0.3	0.080
	47	14	28	1.00	0.60	14.50	8.05	23,000	32,000	7204C	36204	23.49	16.10	19,200	25,600	7204CDB	7204CDF	7204CDT	26.0	41.0	43.5	1.0	0.5	0.098
	47	14	28	1.00	0.60	14.00	7.77	20,000	27,000	7204AC	46204	22.68	15.54	16,200	21,600	7204ACDB	7204ACDF	7204ACDT	26.0	41.0	43.5	1.0	0.5	0.100
	47	14	28	1.00	0.60	13.30	7.63	13,000	18,000	7204B	66204	21.55	15.26	10,800	14,400	7204BDB	7204BDF	7204BDT	26.0	41.0	43.5	1.0	0.5	0.102
	52	15	30	1.10	0.60	18.50	9.96	21,000	29,000	7304C	36304	29.97	19.92	17,400	23,200	7304CDB	7304CDF	7304CDT	27.0	45.0	47.0	1.0	0.6	0.136
	52	15	30	1.10	0.60	17.90	9.62	17,000	24,000	7304AC	46304	29.00	19.24	14,400	19,200	7304ACDB	7304ACDF	7304ACDT	27.0	45.0	47.0	1.0	0.6	0.138
	52	15	30	1.10	0.60	17.30	9.67	13,000	18,000	7304B	66304	28.03	19.34	10,800	14,400	7304BDB	7304BDF	7304BDT	27.0	45.0	47.0	1.0	0.6	0.140
25	47	12	24	0.60	0.30	11.70	7.44	21,000	29,000	7005C	36105	18.95	14.88	17,400	23,200	7005CDB	7005CDF	7005CDT	30.0	42.0	44.5	0.6	0.3	0.091
	47	12	24	0.60	0.30	11.10	7.08	18,000	25,000	7005AC	46105	17.98	14.16	15,000	20,000	7005ACDB	7005ACDF	7005ACDT	30.0	42.0	44.5	0.6	0.3	0.093
	52	15	30	1.00	0.60	16.60	10.20	20,000	28,000	7205C	36205	26.89	20.40	16,800	22,400	7205CDB	7205CDF	7205CDT	31.0	46.0	48.5	1.0	0.5	0.122
	52	15	30	1.00	0.60	15.90	9.77	17,000	24,000	7205AC	46205	25.76	19.54	14,400	19,200	7205ACDB	7205ACDF	7205ACDT	31.0	46.0	48.5	1.0	0.5	0.125
	52	15	30	1.00	0.60	14.80	9.39	11,000	16,000	7205B	66205	23.98	18.78	9,600	12,800	7205BDB	7205BDF	7205BDT	31.0	46.0	48.5	1.0	0.5	0.129
	62	17	34	1.10	0.60	26.00	14.50	18,000	24,000	7305C	36305	42.12	29.00	14,400	19,200	7305CDB	7305CDF	7305CDT	32.0	55.0	57.0	1.0	0.6	0.227
	62	17	34	1.10	0.60	25.20	14.10	14,000	20,000	7305AC	46305	40.82	28.20	12,000	16,000	7305ACDB	7305ACDF	7305ACDT	32.0	55.0	57.0	1.0	0.6	0.230
	62	17	34	1.10	0.60	24.40	14.10	11,000	15,000	7305B	66305	39.53	28.20	9,000	12,000	7305BDB	7305BDF	7305BDT	32.0	55.0	57.0	1.0	0.6	0.234
30	55	13	26	1.00	0.60	15.10	10.25	17,500	25,000	7006C	36106	24.46	20.50	15,000	20,000	7006CDB	7006CDF	7006CDT	36.0	49.0	51.5	1.0	0.5	0.133
	55	13	26	1.00	0.60	14.40	9.80	15,000	21,000	7006AC	46106	23.33	19.60	12,600	16,800	7006ACDB	7006ACDF	7006ACDT	36.0	49.0	51.5	1.0	0.5	0.135
	62	16	32	1.00	0.60	23.00	14.70	17,000	23,000	7206C	36206	37.26	29.40	13,800	18,400	7206CDB	7206CDF	7206CDT	36.0	56.0	58.5	1.0	0.5	0.190
	62	16	32	1.00	0.60	22.10	14.10	14,000	20,000	7206AC	46206	35.80	28.20	12,000	16,000	7206ACDB	7206ACDF	7206ACDT	36.0	56.0	58.5	1.0	0.5	0.193
	62	16	32	1.00	0.60	20.50	13.50	9,400	13,000	7206B	66206	33.21	27.00	7,800	10,400	7206BDB	7206BDF	7206BDT	36.0	56.0	58.5	1.0	0.5	0.197
	72	19	38	1.10	0.60	32.20	20.10	15,000	21,000	7306C	36306	52.16	40.20	12,600	16,800	7306CDB	7306CDF	7306CDT	37.0	65.0	67.0	1.0	0.6	0.339
	72	19	38	1.10	0.60	31.00	19.30	12,000	17,000	7306AC	46306	50.22	38.60	10,200	13,600	7306ACDB	7306ACDF	7306ACDT	37.0	65.0	67.0	1.0	0.6	0.345
	72	19	38	1.10	0.60	31.10	19.30	9,600	13,000	7306B	66306	50.38	38.60	7,800	10,400	7306BDB	7306BDF	7306BDT	37.0	65.0	67.0	1.0	0.6	0.352



d 35~50 mm

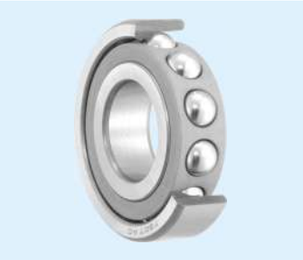


Single row | Back-to-back arrangement DB | Face-to-face arrangement DF | Tandem arrangement DT

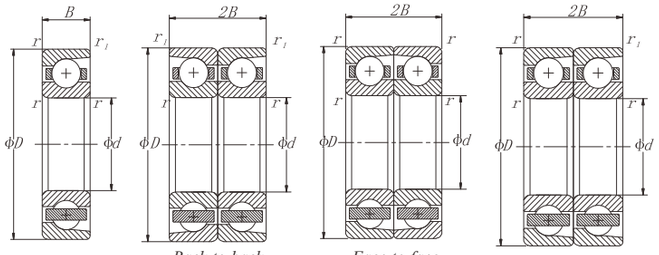


7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

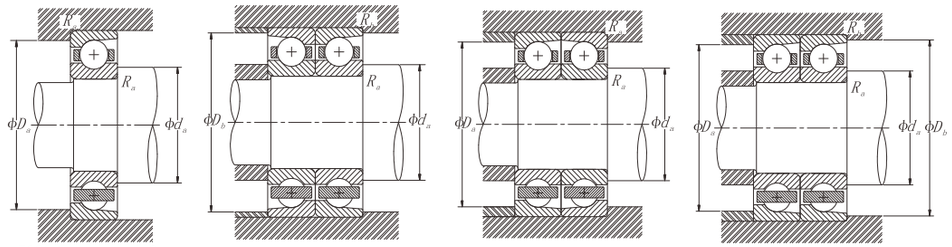
Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN)		Limiting speeds (arrangement)(r/min)		Nominal numbers			Mounting dimensions (mm)				Reference mass (kg)
d	D	B	2B	r (Min)	r1 (Min)	Cr	C0r	Grease	Oil			Cr	C0r	Grease	Oil	Back-to-back	Face-to-face	Tandem	da Min	Da Max	Db Max	Ra Max	Rb Max	
35	62	14	28	1.00	0.60	19.10	13.70	15,000	22,000	7007C	36107	30.94	27.40	13,000	18,000	7007CDB	7007CDF	7007CDT	41.0	56.0	58.5	1.0	0.5	0.160
	62	14	28	1.00	0.60	18.20	13.10	13,000	19,000	7007AC	46107	29.48	26.20	11,000	15,000	7007ACDB	7007ACDF	7007ACDT	41.0	56.0	58.5	1.0	0.5	0.180
	72	17	34	1.10	0.60	30.40	20.00	15,000	20,000	7207C	36207	49.25	40.00	12,000	16,000	7207CDB	7207CDF	7207CDT	42.0	65.0	67.0	1.0	0.6	0.275
	72	17	34	1.10	0.60	29.10	19.10	12,000	17,000	7207AC	46207	47.14	38.20	10,000	14,000	7207ACDB	7207ACDF	7207ACDT	42.0	65.0	67.0	1.0	0.6	0.281
	72	17	34	1.10	0.60	27.10	18.40	8,100	11,000	7207B	66207	43.90	36.80	6,600	8,800	7207BDB	7207BDF	7207BDT	42.0	65.0	67.0	1.0	0.6	0.287
	80	21	42	1.50	1.00	38.50	25.50	13,000	18,000	7307C	36307	62.37	51.00	11,000	14,000	7307CDB	7307CDF	7307CDT	43.5	71.5	74.5	1.5	0.8	0.455
	80	21	42	1.50	1.00	37.00	24.50	11,000	15,000	7307AC	46307	59.94	49.00	9,000	12,000	7307ACDB	7307ACDF	7307ACDT	43.5	71.5	74.5	1.5	0.8	0.462
	80	21	42	1.50	1.00	38.40	24.40	8,400	11,000	7307B	66307	62.21	48.80	6,600	8,800	7307BDB	7307BDF	7307BDT	43.5	71.5	74.5	1.5	0.8	0.469
40	68	15	30	1.00	0.60	20.60	15.90	14,000	19,000	7008C	36108	33.37	31.80	11,000	15,000	7008CDB	7008CDF	7008CDT	46.0	62.0	64.5	1.0	0.5	0.219
	68	15	30	1.00	0.60	19.50	15.10	12,000	17,000	7008AC	46108	31.59	30.20	10,000	14,000	7008ACDB	7008ACDF	7008ACDT	46.0	62.0	64.5	1.0	0.5	0.222
	80	18	36	1.10	0.60	35.20	25.80	13,000	18,000	7208C	36208	57.02	51.60	11,000	14,000	7208CDB	7208CDF	7208CDT	47.0	73.0	75.0	1.0	0.6	0.340
	80	18	36	1.10	0.60	33.60	24.70	11,000	15,000	7208AC	46208	54.43	49.40	9,000	12,000	7208ACDB	7208ACDF	7208ACDT	47.0	73.0	75.0	1.0	0.6	0.355
	80	18	36	1.10	0.60	32.10	23.00	8,300	11,000	7208B	66208	52.00	46.00	6,600	8,800	7208BDB	7208BDF	7208BDT	47.0	73.0	75.0	1.0	0.6	0.375
	90	23	46	1.50	1.00	51.00	34.40	12,000	16,000	7308C	36308	65.93	54.20	9,750	13,000	7308CDB	7308CDF	7308CDT	48.5	81.5	84.5	1.5	0.8	0.610
	90	23	46	1.50	1.00	49.20	33.20	9,500	13,000	7308AC	46308	63.18	51.60	7,500	10,000	7308ACDB	7308ACDF	7308ACDT	48.5	81.5	84.5	1.5	0.8	0.625
	90	23	46	1.50	1.00	44.80	30.20	7,400	9,900	7308B	66308	72.58	60.40	5,900	7,900	7308BDB	7308BDF	7308BDT	48.5	81.5	84.5	1.5	0.8	0.636
45	75	16	32	1.00	0.60	24.40	19.30	12,000	17,500	7009C	36109	39.53	38.60	10,500	14,000	7009CDB	7009CDF	7009CDT	51.0	69.0	71.5	1.0	0.5	0.270
	75	16	32	1.00	0.60	23.10	18.30	11,000	15,000	7009AC	46109	37.42	36.60	9,000	12,000	7009ACDB	7009ACDF	7009ACDT	51.0	69.0	71.5	1.0	0.5	0.282
	85	19	38	1.10	0.60	38.10	27.80	12,000	17,000	7209C	36209	61.72	55.60	10,000	14,000	7209CDB	7209CDF	7209CDT	52.0	78.0	80.0	1.0	0.6	0.395
	85	19	38	1.10	0.60	36.40	26.60	10,000	14,000	7209AC	46209	58.97	53.20	8,200	11,000	7209ACDB	7209ACDF	7209ACDT	52.0	78.0	80.0	1.0	0.6	0.404
	85	19	38	1.10	0.60	36.00	26.30	7,400	9,900	7209B	66209	58.32	52.60	5,900	7,900	7209BDB	7209BDF	7209BDT	52.0	78.0	80.0	1.0	0.6	0.410
	100	25	50	1.50	1.00	68.90	45.80	11,000	14,000	7309C	36309	111.62	91.60	8,400	11,200	7309CDB	7309CDF	7309CDT	53.5	91.5	94.5	1.5	0.8	0.810
	100	25	50	1.50	1.00	66.40	44.00	8,600	12,000	7309AC	46309	107.57	88.00	7,200	9,600	7309ACDB	7309ACDF	7309ACDT	53.5	91.5	94.5	1.5	0.8	0.837
	100	25	50	1.50	1.00	58.30	40.10	6,600	8,900	7309B	66309	94.45	80.20	5,300	7,100	7309BDB	7309BDF	7309BDT	53.5	91.5	94.5	1.5	0.8	0.854
50	80	16	32	1.00	0.60	25.60	20.70	11,000	16,000	7010C	36110	41.47	41.40	9,600	12,800	7010CDB	7010CDF	7010CDT	56.0	74.0	76.5	1.0	0.5	0.300
	80	16	32	1.00	0.60	24.20	19.60	9,900	14,000	7010AC	46110	39.20	39.20	8,400	11,200	7010ACDB	7010ACDF	7010ACDT	56.0	74.0	76.5	1.0	0.5	0.306
	90	20	40	1.10	0.60	44.80	34.00	11,000	15,000	7210C	36210	72.58	68.00	9,000	12,000	7210CDB	7210CDF	7210CDT	57.0	83.0	85.0	1.0	0.6	0.448
	90	20	40	1.10	0.60	42.70	32.50	9,400	13,000	7210AC	46210	69.17	65.00	7,500	10,000	7210ACDB	7210ACDF	7210ACDT	57.0	83.0	85.0	1.0	0.6	0.457



d 50~65 mm

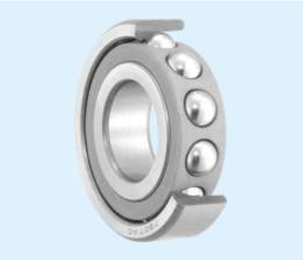


Single row | *Back-to-back arrangement DB* | *Face-to-face arrangement DF* | *Tandem arrangement DT*

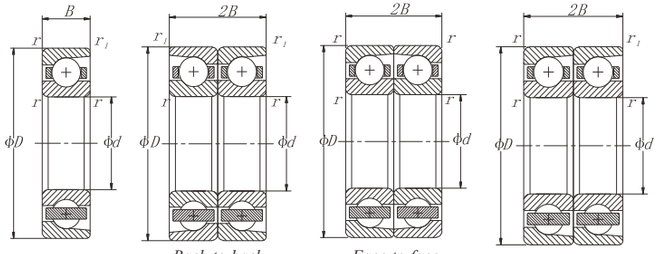


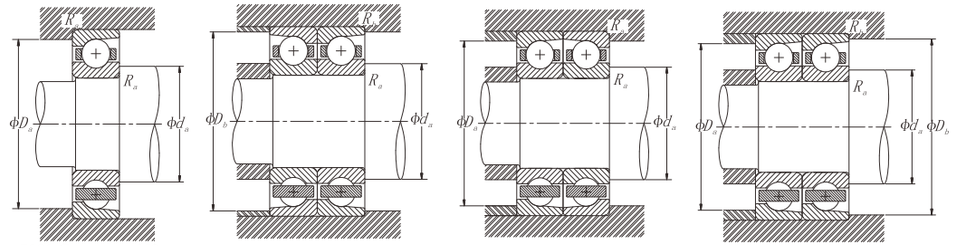
7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN)		Limiting speeds (arrangement)(r/min)		Nominal numbers			Mounting dimensions (mm)					Reference mass (kg)
d	D	B	2B	r (Min)	r_1 (Min)	C_r	C_{0r}	Grease	Oil			C_r	C_{0r}	Grease	Oil	Back-to-back	Face-to-face	Tandem	d_a Min	D_a Max	D_b Max	R_a Max	R_b Max	
50	90	20	40	1.10	0.60	37.40	28.60	6700	9000	**7210B**	**66210**	60.6	57.2	5,400	7,200	**7210BDB**	**7210BDF**	**7210BDT**	57.0	83.0	85.0	1.0	0.6	0.466
	110	27	54	2.00	1.00	80.20	54.40	9600	13000	**7310C**	**36310**	129.9	108.8	7,800	10,400	**7310CDB**	**7310CDF**	**7310CDT**	60.0	100.0	104.0	2.0	1.0	1.070
	110	27	54	2.00	1.00	77.30	52.40	7700	11000	**7310AC**	**46310**	125.2	104.8	6,600	8,800	**7310ACDB**	**7310ACDF**	**7310ACDT**	60.0	100.0	104.0	2.0	1.0	1.090
	110	27	54	2.00	1.00	68.20	47.90	5400	7500	**7310B**	**66310**	110.5	95.8	4,500	6,000	**7310BDB**	**7310BDF**	**7310BDT**	60.0	100.0	104.0	2.0	1.0	1.110
55	90	18	36	1.10	0.60	36.40	29.10	10,000	14,000	**7011C**	**36111**	59.0	58.2	8,400	11,200	**7011CDB**	**7011CDF**	**7011CDT**	62.0	83.0	85.0	1.0	0.6	0.210
	90	18	36	1.10	0.60	34.50	27.60	8,800	12,000	**7011AC**	**46110**	55.9	55.2	7,200	9,600	**7011ACDB**	**7011ACDF**	**7011ACDT**	62.0	83.0	85.0	1.0	0.6	0.214
	100	21	42	1.50	1.00	52.90	39.90	10,000	14,000	**7211C**	**36211**	85.7	79.8	8,400	11,200	**7211CDB**	**7211CDF**	**7211CDT**	63.5	91.5	94.5	1.5	0.8	0.589
	100	21	42	1.50	1.00	50.50	38.20	8,500	12,000	**7211AC**	**46211**	81.8	76.4	7,200	9,600	**7211ACDB**	**7211ACDF**	**7211ACDT**	63.5	91.5	94.5	1.5	0.8	0.600
	100	21	42	1.50	1.00	46.30	36.10	6,100	8,200	**7211B**	**66211**	75.0	72.2	4,900	6,600	**7211BDB**	**7211BDF**	**7211BDT**	63.5	91.5	94.5	1.5	0.8	0.612
	120	29	58	2.00	1.00	86.60	60.00	8,800	12,000	**7311C**	**36311**	140.3	120.0	7,200	9,600	**7311CDB**	**7311CDF**	**7311CDT**	65.0	110.0	114.0	2.0	1.0	1.370
	120	29	58	2.00	1.00	83.30	57.90	7,100	9,800	**7311AC**	**46311**	134.9	115.8	5,900	7,800	**7311ACDB**	**7311ACDF**	**7311ACDT**	65.0	110.0	114.0	2.0	1.0	1.390
	120	29	58	2.00	1.00	78.80	56.30	4,900	6,900	**7311B**	**66311**	127.7	112.6	4,100	5,500	**7311BDB**	**7311BDF**	**7311BDT**	65.0	110.0	114.0	2.0	1.0	1.420
60	95	18	36	1.10	0.60	39.00	33.10	9,600	13,500	**7012C**	**36112**	63.2	66.2	8,100	10,800	**7012CDB**	**7012CDF**	**7012CDT**	67.0	88.0	90.0	1.0	0.6	0.467
	95	18	36	1.10	0.60	37.00	31.40	8,300	11,600	**7012AC**	**46112**	59.9	62.8	7,000	9,300	**7012ACDB**	**7012ACDF**	**7012ACDT**	67.0	88.0	90.0	1.0	0.6	0.478
	110	22	44	1.50	1.00	61.00	48.30	9,100	13,000	**7212C**	**36212**	98.8	96.6	7,800	10,400	**7212CDB**	**7212CDF**	**7212CDT**	68.5	101.5	104.5	1.5	0.8	0.750
	110	22	44	1.50	1.00	58.20	46.00	7,800	11,000	**7212AC**	**46212**	94.3	92.0	6,600	8,800	**7212ACDB**	**7212ACDF**	**7212ACDT**	68.5	101.5	104.5	1.5	0.8	0.765
	110	22	44	1.50	1.00	56.10	44.40	5,700	7,600	**7212B**	**66212**	90.9	88.8	4,600	6,100	**7212BDB**	**7212BDF**	**7212BDT**	68.5	101.5	104.5	1.5	0.8	0.780
	130	31	62	2.10	1.10	99.10	70.00	8,100	11,000	**7312C**	**36312**	160.5	140.0	6,600	8,800	**7312CDB**	**7312CDF**	**7312CDT**	72.0	118.0	123.0	2.0	1.0	1.700
	130	31	62	2.10	1.10	95.30	67.30	6,500	9,100	**7312AC**	**46312**	154.4	134.6	5,500	7,300	**7312ACDB**	**7312ACDF**	**7312ACDT**	72.0	118.0	123.0	2.0	1.0	1.740
	130	31	62	2.10	1.10	90.00	65.50	4,500	6,300	**7312B**	**66312**	145.8	131.0	3,800	5,000	**7312BDB**	**7312BDF**	**7312BDT**	72.0	118.0	123.0	2.0	1.0	1.770
65	100	18	36	1.10	0.60	41.50	37.20	9,000	13,000	**7013C**	**36113**	67.2	74.4	7,800	10,400	**7013CDB**	**7013CDF**	**7013CDT**	72.0	93.0	95.0	1.0	0.6	0.495
	100	18	36	1.10	0.60	39.30	35.40	7,800	11,000	**7013AC**	**46113**	63.7	70.8	6,600	8,800	**7013ACDB**	**7013ACDF**	**7013ACDT**	72.0	93.0	95.0	1.0	0.6	0.509
	120	23	46	1.50	1.00	60.70	49.30	8,400	12,000	**7213C**	**36213**	98.3	98.6	7,200	9,600	**7213CDB**	**7213CDF**	**7213CDT**	73.5	111.5	114.5	1.5	0.8	0.945
	120	23	46	1.50	1.00	57.70	47.10	7,100	9,900	**7213AC**	**46213**	93.5	94.2	5,900	7,900	**7213ACDB**	**7213ACDF**	**7213ACDT**	73.5	111.5	114.5	1.5	0.8	0.962
	120	23	46	1.50	1.00	63.60	52.60	5,200	7,000	**7213B**	**66213**	103.0	105.2	4,200	5,600	**7213BDB**	**7213BDF**	**7213BDT**	73.5	111.5	114.5	1.5	0.8	0.981
	140	33	66	2.10	1.10	112.20	80.50	7,500	10,000	**7313C**	**36313**	181.8	161.0	6,000	8,000	**7313CDB**	**7313CDF**	**7313CDT**	77.0	128.0	133.0	2.0	1.0	2.090
	140	33	66	2.10	1.10	107.90	77.40	6,000	8,400	**7313AC**	**46313**	174.8	154.8	5,000	6,700	**7313ACDB**	**7313ACDF**	**7313ACDT**	77.0	128.0	133.0	2.0	1.0	2.110
	140	33	66	2.10	1.10	101.80	75.40	4,200	5,900	**7313B**	**66313**	164.9	150.8	3,500	4,700	**7313BDB**	**7313BDF**	**7313BDT**	77.0	128.0	133.0	2.0	1.0	2.150



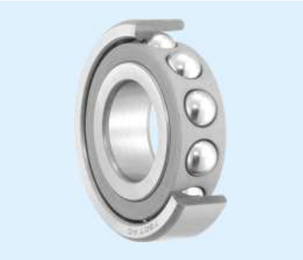
d 70~85 mm



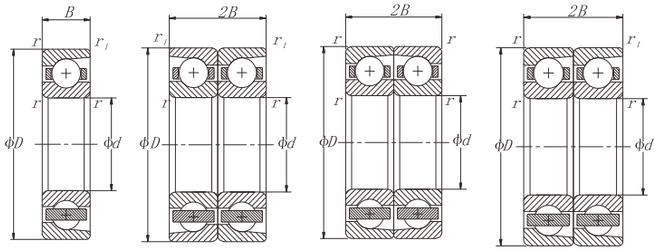


7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

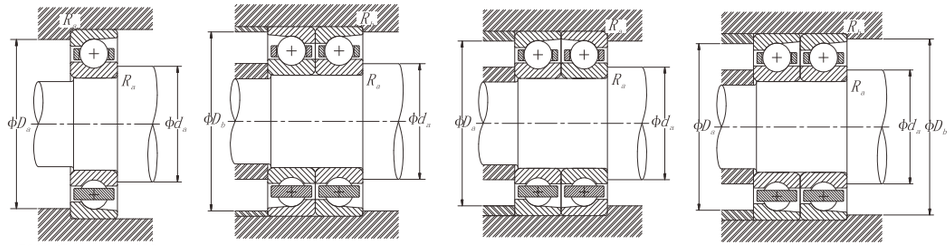
Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN)		Limiting speeds (arrangement)(r/min)		Nominal numbers			Mounting dimensions (mm)				Reference mass (kg)
d	D	B	2B	r (Min)	r_1 (Min)	C_r	C_{0r}	Grease	Oil			C_r	C_{0r}	Grease	Oil	Back-to-back	Face-to-face	Tandem	d_a Min	D_a Max	D_b Max	R_a Max	R_b Max	
70	110	20	40	1.10	0.60	49.90	45.50	8,300	11,500	**7014C**	**36114**	80.8	91.0	6,900	9,200	**7014CDB**	**7014CDF**	**7014CDT**	77.0	103.0	105.0	1.0	0.6	0.690
	110	20	40	1.10	0.60	47.30	43.30	7,100	10,000	**7014AC**	**46114**	76.6	86.6	6,000	8,000	**7014ACDB**	**7014ACDF**	**7014ACDT**	77.0	103.0	105.0	1.0	0.6	0.705
	125	24	48	1.50	1.00	76.10	63.50	8,000	11,000	**7214C**	**36214**	123.3	127.0	6,600	8,800	**7214CDB**	**7214CDF**	**7214CDT**	78.5	116.5	119.5	1.5	0.8	1.070
	125	24	48	1.50	1.00	72.50	60.60	6,800	9,400	**7214AC**	**46214**	117.5	121.2	5,600	7,500	**7214ACDB**	**7214ACDF**	**7214ACDT**	78.5	116.5	119.5	1.5	0.8	1.090
	125	24	48	1.50	1.00	69.10	57.80	4,900	6,500	**7214B**	**66214**	111.9	115.6	3,900	5,200	**7214BDB**	**7214BDF**	**7214BDT**	78.5	116.5	119.5	1.5	0.8	1.110
	150	35	70	2.10	1.10	126.20	91.90	7,000	9,500	**7314C**	**36314**	204.4	183.8	5,700	7,600	**7314CDB**	**7314CDF**	**7314CDT**	82.0	138.0	143.0	2.0	1.0	2.510
	150	35	70	2.10	1.10	121.30	88.30	5,600	7,800	**7314AC**	**46314**	196.5	176.6	4,700	6,200	**7314ACDB**	**7314ACDF**	**7314ACDT**	82.0	138.0	143.0	2.0	1.0	2.560
	150	35	70	2.10	1.10	114.40	86.00	4,400	5,800	**7314B**	**66314**	185.3	172.0	3,500	4,600	**7314BDB**	**7314BDF**	**7314BDT**	82.0	138.0	143.0	2.0	1.0	2.610
75	115	20	40	1.10	0.60	51.20	48.30	7,800	11,000	**7015C**	**36115**	82.9	96.6	6,600	8,800	**7015CDB**	**7015CDF**	**7015CDT**	82.0	108.0	110.0	1.0	0.6	0.730
	115	20	40	1.10	0.60	48.50	46.00	6,700	9,500	**7015AC**	**46115**	78.6	92.0	5,700	7,600	**7015ACDB**	**7015ACDF**	**7015ACDT**	82.0	108.0	110.0	1.0	0.6	0.745
	130	25	50	1.50	1.00	75.90	64.40	7,600	10,500	**7215C**	**36215**	123.0	128.8	6,300	8,400	**7215CDB**	**7215CDF**	**7215CDT**	83.5	121.5	124.5	1.5	0.8	1.150
	130	25	50	1.50	1.00	72.20	61.50	6,400	9,000	**7215AC**	**46215**	117.0	123.0	5,400	7,200	**7215ACDB**	**7215ACDF**	**7215ACDT**	83.5	121.5	124.5	1.5	0.8	1.170
	130	25	50	1.50	1.00	68.60	58.30	4,500	6,000	**7215B**	**66215**	111.1	116.6	3,600	4,800	**7215BDB**	**7215BDF**	**7215BDT**	83.5	121.5	124.5	1.5	0.8	1.190
	160	37	74	2.10	1.10	137.50	104.10	6,500	8,900	**7315C**	**36315**	222.8	208.2	5,300	7,100	**7315CDB**	**7315CDF**	**7315CDT**	87.0	148.0	153.0	2.0	1.0	3.020
	160	37	74	2.10	1.10	132.10	100.00	5,300	7,300	**7315AC**	**46315**	214.0	200.0	4,400	5,800	**7315ACDB**	**7315ACDF**	**7315ACDT**	87.0	148.0	153.0	2.0	1.0	3.070
	160	37	74	2.10	1.10	124.50	97.30	4,100	5,400	**7315B**	**66315**	201.7	194.6	3,200	4,300	**7315BDB**	**7315BDF**	**7315BDT**	87.0	148.0	153.0	2.0	1.0	3.130
80	125	22	44	1.10	0.60	58.70	55.20	7,300	10,000	**7016C**	**36116**	95.1	110.4	6,000	8,000	**7016CDB**	**7016CDF**	**7016CDT**	87.0	118.0	120.0	1.0	0.6	0.980
	125	22	44	1.10	0.60	55.50	52.50	6,300	8,800	**7016AC**	**46116**	89.9	105.0	5,300	7,000	**7016ACDB**	**7016ACDF**	**7016ACDT**	87.0	118.0	120.0	1.0	0.6	0.994
	140	26	52	2.00	1.00	93.20	81.50	7,100	9,800	**7216C**	**36216**	151.0	163.0	5,900	7,800	**7216CDB**	**7216CDF**	**7216CDT**	90.0	130.0	134.0	2.0	1.0	1.360
	140	26	52	2.00	1.00	88.70	78.00	6,000	8,300	**7216AC**	**46216**	143.7	156.0	5,000	6,600	**7216ACDB**	**7216ACDF**	**7216ACDT**	90.0	130.0	134.0	2.0	1.0	1.390
	140	26	52	2.00	1.00	80.50	69.20	4,300	5,700	**7216B**	**66216**	130.4	138.4	3,400	4,600	**7216BDB**	**7216BDF**	**7216BDT**	90.0	130.0	134.0	2.0	1.0	1.420
	170	39	78	2.10	1.10	149.00	116.90	6,100	8,400	**7316C**	**36316**	241.4	233.8	5,000	6,700	**7316CDB**	**7316CDF**	**7316CDT**	92.0	158.0	163.0	2.0	1.0	3.590
	170	39	78	2.10	1.10	143.10	112.20	5,000	6,900	**7316AC**	**46316**	231.8	224.4	4,100	5,500	**7316ACDB**	**7316ACDF**	**7316ACDT**	92.0	158.0	163.0	2.0	1.0	3.650
	170	39	78	2.10	1.10	134.80	109.20	3,800	5,100	**7316B**	**66316**	218.4	218.4	3,100	4,100	**7316BDB**	**7316BDF**	**7316BDT**	92.0	158.0	163.0	2.0	1.0	3.720
85	130	22	44	1.10	0.60	60.20	58.60	6,900	9,800	**7017C**	**36116**	97.5	117.2	5,900	7,800	**7017CDB**	**7017CDF**	**7017CDT**	92.0	123.0	125.0	1.0	0.6	1.020
	130	22	44	1.10	0.60	56.90	55.50	6,000	8,400	**7017AC**	**46117**	92.2	111.0	5,000	6,700	**7017ACDB**	**7017ACDF**	**7017ACDT**	92.0	123.0	125.0	1.0	0.6	1.040
	150	28	56	2.00	1.00	92.40	78.90	6,600	9,200	**7217C**	**36217**	149.7	157.8	5,500	7,400	**7217CDB**	**7217CDF**	**7217CDT**	95.0	140.0	144.0	2.0	1.0	1.760
	150	28	56	2.00	1.00	87.90	75.30	5,600	7,800	**7217AC**	**46217**	142.4	150.6	4,700	6,200	**7217ACDB**	**7217ACDF**	**7217ACDT**	95.0	140.0	144.0	2.0	1.0	1.780



d 85~100 mm

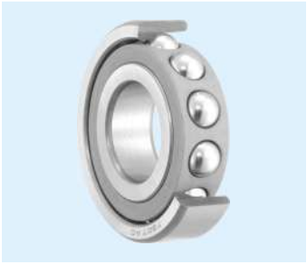


Single row | *Back-to-back arrangement DB* | *Face-to-face arrangement DF* | *Tandem arrangement DT*

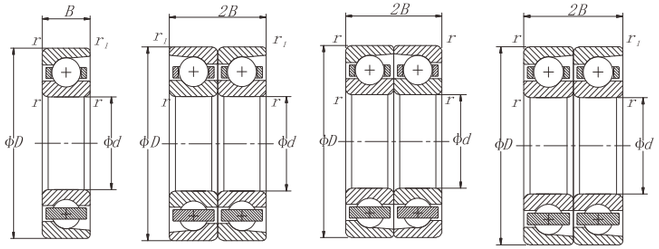


7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

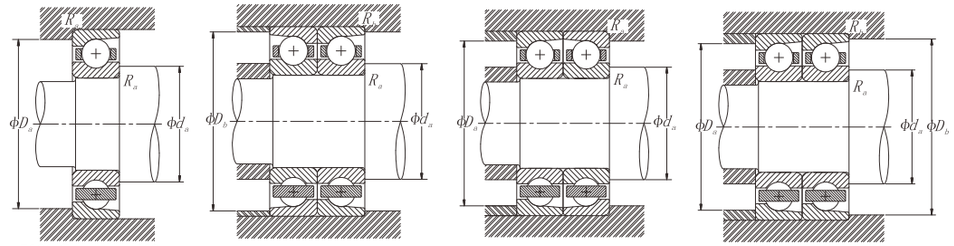
Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN)		Limiting speeds (arrangement)(r/min)		Nominal numbers			Mounting dimensions (mm)					Reference mass (kg)
d	D	B	2B	r (Min)	r_1 (Min)	C_r	C_{0r}	Grease	Oil			C_r	C_{0r}	Grease	Oil	Back-to-back	Face-to-face	Tandem	d_a Min	D_a Max	D_b Max	R_a Max	R_b Max	
85	150	28	56	2.00	1.00	79.70	70.20	4000	5300	**7217B**	**66217**	129.1	140.4	3,200	4,200	**7217BDB**	**7217BDF**	**7217BDT**	95.0	140.0	144.0	2.0	1.0	1.820
	180	41	82	3.00	1.10	160.70	130.50	5800	7900	**7317C**	**36317**	260.3	261.0	4,700	6,300	**7317CDB**	**7317CDF**	**7317CDT**	99.0	166.0	173.0	2.5	1.0	4.260
	180	41	82	3.00	1.10	154.30	125.30	4700	6500	**7317AC**	**46317**	250.0	250.6	3,900	5,200	**7317ACDB**	**7317ACDF**	**7317ACDT**	99.0	166.0	173.0	2.5	1.0	4.340
	180	41	82	3.00	1.10	145.40	121.80	3600	4800	**7317B**	**66317**	235.5	243.6	2,900	3,800	**7317BDB**	**7317BDF**	**7317BDT**	99.0	166.0	173.0	2.5	1.0	4.430
90	140	24	48	1.50	1.00	66.60	65.80	6,500	9,100	**7018C**	**36118**	107.9	131.6	5,500	7,300	**7018CDB**	**7018CDF**	**7018CDT**	98.5	131.5	134.5	1.5	0.8	1.310
	140	24	48	1.50	1.00	63.00	62.40	5,600	7,850	**7018AC**	**46118**	102.1	124.8	4,700	6,300	**7018ACDB**	**7018ACDF**	**7018ACDT**	98.5	131.5	134.5	1.5	0.8	1.350
	160	30	60	2.00	1.00	122.60	104.80	6,200	8,600	**7218C**	**36218**	198.6	209.6	5,200	6,900	**7218CDB**	**7218CDF**	**7218CDT**	100.0	150.0	154.0	2.0	1.0	2.140
	160	30	60	2.00	1.00	116.90	99.90	5,300	7,300	**7218AC**	**46218**	189.4	199.8	4,400	5,800	**7218ACDB**	**7218ACDF**	**7218ACDT**	100.0	150.0	154.0	2.0	1.0	2.180
	160	30	60	2.00	1.00	106.60	93.70	3,800	5,000	**7218B**	**66218**	172.7	187.4	3,000	4,000	**7218BDB**	**7218BDF**	**7218BDT**	100.0	150.0	154.0	2.0	1.0	2.220
	190	43	86	3.00	1.10	183.10	158.00	5,500	7,500	**7318C**	**36318**	296.6	316.0	4,500	6,000	**7318CDB**	**7318CDF**	**7318CDT**	104.0	176.0	183.0	2.5	1.0	4.970
	190	43	86	3.00	1.10	175.70	151.70	4,400	6,200	**7138AC**	**46318**	284.6	303.4	3,700	5,000	**7318ACDB**	**7138ACDF**	**7138ACDT**	104.0	176.0	183.0	2.5	1.0	5.060
	190	43	86	3.00	1.10	156.20	135.20	3,400	4,500	**7318B**	**66318**	253.0	270.4	2,700	3,600	**7318BDB**	**7318BDF**	**7318BDT**	104.0	176.0	183.0	2.5	1.0	5.160
95	145	24	48	1.50	1.00	73.50	73.20	6,200	8,750	**7019C**	**36119**	119.1	146.4	5,300	7,000	**7019CDB**	**7019CDF**	**7019CDT**	103.5	136.5	139.5	1.5	0.8	1.370
	145	24	48	1.50	1.00	69.50	69.30	5,300	7,500	**7019AC**	**46119**	112.6	138.6	4,500	6,000	**7019ACDB**	**7019ACDF**	**7019ACDT**	103.5	136.5	139.5	1.5	0.8	1.410
	170	32	64	2.00	1.10	132.60	111.90	5,900	8,200	**7219C**	**36219**	214.8	223.8	4,900	6,600	**7219CDB**	**7219CDF**	**7219CDT**	107.0	158.0	163.0	2.0	1.0	2.620
	170	32	64	2.00	1.10	126.50	106.80	5,000	6,900	**7219AC**	**46219**	204.9	213.6	4,100	5,500	**7219ACDB**	**7219ACDF**	**7219ACDT**	107.0	158.0	163.0	2.0	1.0	2.670
	170	32	64	2.00	1.10	115.80	100.60	3,500	4,700	**7219B**	**66219**	187.6	201.2	2,800	3,800	**7219BDB**	**7219BDF**	**7219BDT**	107.0	158.0	163.0	2.0	1.0	2.720
	200	45	90	3.00	1.10	185.00	159.80	5,200	7,100	**7319C**	**36319**	299.7	319.6	4,300	5,700	**7319CDB**	**7319CDF**	**7319CDT**	109.0	186.0	193.0	2.5	1.0	5.770
	200	45	90	3.00	1.10	177.60	153.50	4,200	5,800	**7319AC**	**46319**	287.7	307.0	3,500	4,600	**7319ACDB**	**7319ACDF**	**7319ACDT**	109.0	186.0	193.0	2.5	1.0	5.890
	200	45	90	3.00	1.10	167.20	149.20	3,200	4,200	**7319B**	**66319**	270.9	298.4	2,500	3,400	**7319BDB**	**7319BDF**	**7319BDT**	109.0	186.0	193.0	2.5	1.0	6.000
100	150	24	48	1.50	1.00	75.30	77.20	6,000	8,400	**7020C**	**36120**	122.0	154.4	5,000	6,700	**7020CDB**	**7020CDF**	**7020CDT**	108.5	141.5	144.5	1.5	0.8	1.400
	150	24	48	1.50	1.00	71.20	73.10	5,100	7,200	**7020AC**	**46120**	115.3	146.2	4,300	5,800	**7020ACDB**	**7020ACDF**	**7020ACDT**	108.5	141.5	144.5	1.5	0.8	1.470
	180	34	68	2.10	1.10	149.00	126.90	5,600	7,700	**7220C**	**36220**	241.4	253.8	4,600	6,200	**7220CDB**	**7220CDF**	**7220CDT**	112.0	168.0	173.0	2.0	1.0	3.120
	180	34	68	2.10	1.10	142.10	121.20	4,700	6,600	**7220AC**	**46220**	230.2	242.4	4,000	5,300	**7220ACDB**	**7220ACDF**	**7220ACDT**	112.0	168.0	173.0	2.0	1.0	3.260
	180	34	68	2.10	1.10	130.20	114.30	3,400	4,500	**7220B**	**66220**	210.9	228.6	2,700	3,600	**7220BDB**	**7220BDF**	**7220BDT**	112.0	168.0	173.0	2.0	1.0	3.400
	215	47	94	3.00	1.10	222.10	206.80	4,900	6,700	**7320C**	**36320**	359.8	413.6	4,000	5,400	**7320CDB**	**7320CDF**	**7320CDT**	114.0	201.0	208.0	2.5	1.0	7.050
	215	47	94	3.00	1.10	213.60	198.60	3,900	5,500	**7320AC**	**46320**	346.0	397.2	3,300	4,400	**7320ACDB**	**7320ACDF**	**7320ACDT**	114.0	201.0	208.0	2.5	1.0	7.180
	215	47	94	3.00	1.10	190.10	177.40	3,000	4,000	**7320B**	**66320**	308.0	354.8	2,400	3,200	**7320BDB**	**7320BDF**	**7320BDT**	114.0	201.0	208.0	2.5	1.0	7.320



d 105~130 mm

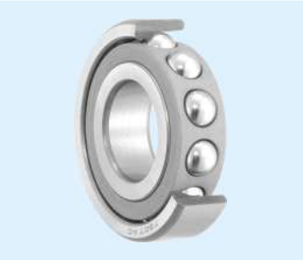


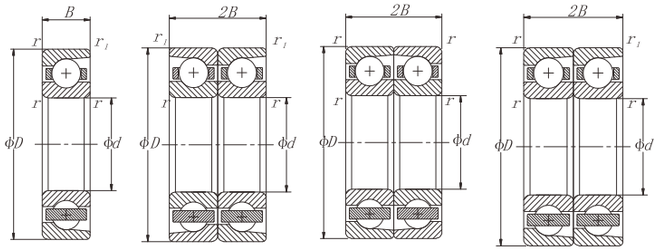
Single row | *Back-to-back arrangement DB* | *Face-to-face arrangement DF* | *Tandem arrangement DT*



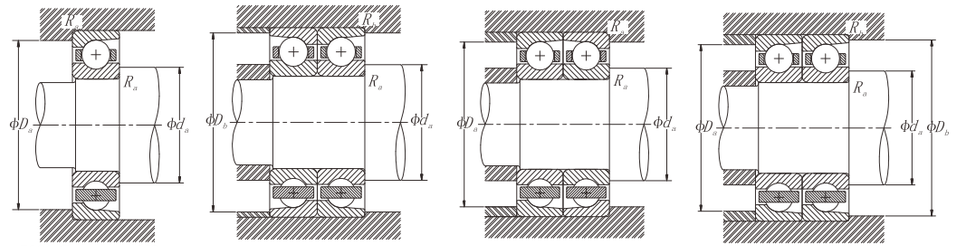
7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN)		Limiting speeds (arrangement)(r/min)		Nominal numbers			Mounting dimensions (mm)					Reference mass (kg)
d	D	B	2B	r (Min)	r_1 (Min)	C_r	C_{0r}	Grease	Oil			C_r	C_{0r}	Grease	Oil	Back-to-back	Face-to-face	Tandem	d_a Min	D_a Max	D_b Max	R_a Max	R_b Max	
105	160	26	52	2.00	1.00	88.1	89.4	5600	7900	**7021C**	**36121**	142.7	178.8	1788	6300	**7021CDB**	**7021CDF**	**7021CDT**	115.0	150.0	154.0	2.0	1.0	1.780
	160	26	52	2.00	1.00	83.3	84.7	4800	6800	**7021AC**	**46121**	134.9	169.4	1694	5400	**7021ACDB**	**7021ACDF**	**7021ACDT**	115.0	150.0	154.0	2.0	1.0	1.860
	190	36	72	2.10	1.10	162.4	142.9	5300	7300	**7221C**	**36221**	263.1	285.8	2858	5800	**7221CDB**	**7221CDF**	**7221CDT**	117.0	178.0	183.0	2.0	1.0	3.700
	190	36	72	2.10	1.10	154.9	136.7	4500	6200	**7221AC**	**46221**	250.9	273.4	2734	5000	**7221ACDB**	**7221ACDF**	**7221ACDT**	117.0	178.0	183.0	2.0	1.0	3.790
	190	36	72	2.10	1.10	142.0	128.9	3200	4300	**7221B**	**66221**	230.0	257.8	2578	3400	**7221BDB**	**7221BDF**	**7221BDT**	117.0	178.0	183.0	2.0	1.0	3.870
	225	49	98	3.00	1.10	222.6	206.8	4600	6300	**7321C**	**36321**	360.6	413.6	4136	5000	**7321CDB**	**7321CDF**	**7321CDT**	119.0	211.0	218.0	2.5	1.0	8.070
	225	49	98	3.00	1.10	213.9	198.6	3800	5200	**7321AC**	**46321**	346.5	397.2	3972	4200	**7321ACDB**	**7321ACDF**	**7321ACDT**	119.0	211.0	218.0	2.5	1.0	8.200
	225	49	98	3.00	1.10	190.4	177.3	2900	4500	**7321B**	**66321**	308.4	354.6	3546	3600	**7321BDB**	**7321BDF**	**7321BDT**	119.0	211.0	218.0	2.5	1.0	8.360
110	170	28	56	2.00	1.00	104.3	106.3	5300	7500	**7022C**	**36122**	169.0	212.6	2126	6000	**7022CDB**	**7022CDF**	**7022CDT**	120.0	160.0	164.0	2.0	1.0	2.200
	170	28	56	2.00	1.00	98.7	101.1	4600	6450	**7022AC**	**46122**	159.9	202.2	2022	5200	**7022ACDB**	**7022ACDF**	**7022ACDT**	120.0	160.0	164.0	2.0	1.0	2.300
	200	38	76	2.10	1.10	175.8	159.6	5000	7000	**7222C**	**36222**	284.8	319.2	3192	5600	**7222CDB**	**7222CDF**	**7222CDT**	122.0	188.0	193.0	2.0	1.0	4.370
	200	38	76	2.10	1.10	167.8	152.9	4300	5900	**7222AC**	**46222**	271.8	305.8	3058	4700	**7222ACDB**	**7222ACDF**	**7222ACDT**	122.0	188.0	193.0	2.0	1.0	4.450
	200	38	76	2.10	1.10	153.9	144.3	3000	4000	**7222B**	**66222**	249.3	288.6	2886	3200	**7222BDB**	**7222BDF**	**7222BDT**	122.0	188.0	193.0	2.0	1.0	4.540
	240	50	100	3.00	1.10	248.4	240.1	4400	6000	**7322C**	**36322**	402.4	480.2	4802	4800	**7322CDB**	**7322CDF**	**7322CDT**	124.0	226.0	233.0	2.5	1.0	9.400
	240	50	100	3.00	1.10	239.0	231.4	3500	4900	**7322AC**	**46322**	387.2	462.8	4628	3900	**7322ACDB**	**7322ACDF**	**7322ACDT**	124.0	226.0	233.0	2.5	1.0	9.600
	240	50	100	3.00	1.10	225.8	225.3	2700	3700	**7322B**	**66322**	365.8	450.6	4506	3000	**7322BDB**	**7322BDF**	**7322BDT**	124.0	226.0	233.0	2.5	1.0	9.800
120	180	28	56	2.00	1.00	112.1	116.5	5000	7000	**7024C**	**36124**	181.6	233.0	2330	5600	**7024CDB**	**7024CDF**	**7024CDT**	130.0	170.0	174.0	2.0	1.0	2.330
	180	28	56	2.00	1.00	106.1	110.5	4300	6000	**7024AC**	**46124**	171.9	221.0	2210	4800	**7024ACDB**	**7024ACDF**	**7024ACDT**	130.0	170.0	174.0	2.0	1.0	2.470
	215	40	80	2.10	1.10	198.4	192.2	4600	6400	**7224C**	**36224**	321.4	384.4	3844	5100	**7224CDB**	**7224CDF**	**7224CDT**	132.0	203.0	208.0	2.0	1.0	6.180
	215	40	80	2.10	1.10	189.2	183.5	3900	5500	**7224AC**	**46224**	306.5	367.0	3670	4400	**7224ACDB**	**7224ACDF**	**7224ACDT**	132.0	203.0	208.0	2.0	1.0	6.260
	215	40	80	2.10	1.10	165.4	161.4	2800	3700	**7224B**	**66224**	267.9	322.8	3228	3000	**7224BDB**	**7224BDF**	**7224BDT**	132.0	203.0	208.0	2.0	1.0	6.320
	260	55	110	2.10	1.10	265.1	270.6	4000	5500	**7324C**	**36324**	429.5	541.2	5412	4400	**7324CDB**	**7324CDF**	**7324CDT**	134.0	246.0	253.0	2.5	1.0	14.500
	260	55	110	2.10	1.10	254.1	260.5	3300	4500	**7324AC**	**46324**	411.6	521.0	5210	3600	**7324ACDB**	**7324ACDF**	**7324ACDT**	134.0	246.0	253.0	2.5	1.0	14.700
	260	55	110	2.10	1.10	225.1	231.3	2500	3300	**7324B**	**66324**	364.7	462.6	4626	2600	**7324BDB**	**7324BDF**	**7324BDT**	134.0	246.0	253.0	2.5	1.0	14.900
130	200	33	66	2.00	1.00	129.0	137.0	4500	6400	**7026C**	**36126**	209.0	274.0	2740	5100	**7026CDB**	**7026CDF**	**7026CDT**	140.0	190.0	194.0	2.0	1.0	3.610
	200	33	66	2.00	1.00	122.0	130.0	3900	5500	**7026AC**	**46126**	197.6	260.0	2600	4400	**7026ACDB**	**7026ACDF**	**7026ACDT**	140.0	190.0	194.0	2.0	1.0	3.730
	230	40	80	3.00	1.10	206.5	209.0	4300	6000	**7226C**	**36226**	334.5	418.0	4180	4800	**7226CDB**	**7226CDF**	**7226CDT**	144.0	216.0	223.0	2.5	1.0	9.960
	230	40	80	3.00	1.10	196.5	199.8	3700	5100	**7226AC**	**46226**	318.3	399.6	3996	4100	**7226ACDB**	**7226ACDF**	**7226ACDT**	144.0	216.0	223.0	2.5	1.0	7.150





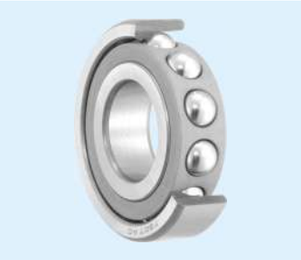
Single row　Back-to-back arrangement DB　Face-to-face arrangement DF　Tandem arrangement DT

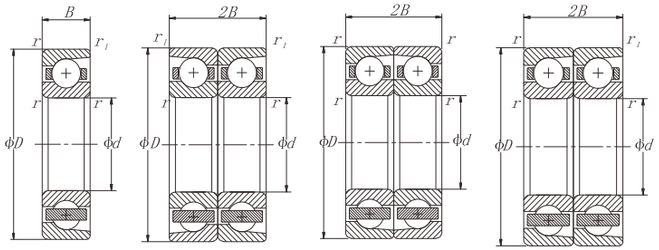


7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

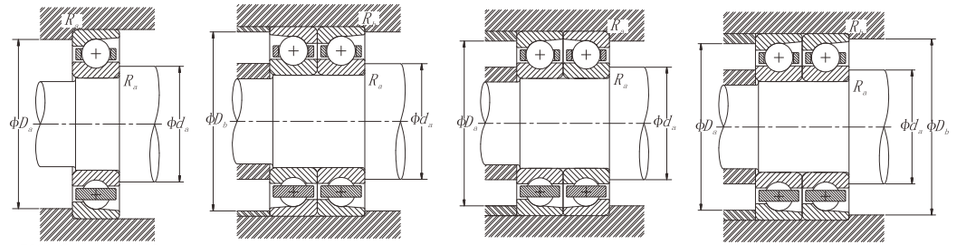
d 130~160 mm

d	Boundary dimensions (mm) D	B	2B	r (Min)	r1 (Min)	Basic load ratings (kN) Cr	C0r	Limiting speeds (r/min) Grease	Oil	Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN) Cr	C0r	Limiting speeds (arrangement)(r/min) Grease	Oil	Nominal numbers Back-to-back	Face-to-face	Tandem	Mounting dimensions (mm) da Min	Da Max	Db Max	Ra Max	Rb Max	Reference mass (kg)
130	230	40	80	3.00	1.10	171.0	174.5	2500	3400	7226B	66226	277.0	349.0	2000	2700	7226BDB	7226BDF	7226BDT	144.0	216.0	223.0	2.5	1.0	7.330
	280	58	116	4.00	1.50	294.1	314.1	3700	5100	7326C	36326	476.4	628.2	3100	4100	7326CDB	7326CDF	7326CDT	148.0	262.0	271.5	3.0	1.5	17.400
	280	58	116	4.00	1.50	281.9	302.3	3000	4200	7326AC	46326	456.7	604.6	2500	3400	7326ACDB	7326ACDF	7326ACDT	148.0	262.0	271.5	3.0	1.5	17.600
	280	58	116	4.00	1.50	249.7	268.4	2300	3100	7326B	66322	404.5	536.8	1900	2500	7326BDB	7326BDF	7326BDT	148.0	262.0	271.5	3.0	1.5	17.800
140	210	33	66	2.00	1.00	132.0	145.0	4300	6000	7028C	36128	213.8	290.0	3600	4800	7028CDB	7028CDF	7028CDT	150.0	200.0	204.0	2.0	1.0	3.820
	210	33	66	2.00	1.00	125.0	138.0	3700	5200	7028AC	46128	202.5	276.0	3100	4200	7028ACDB	7028ACDF	7028ACDT	150.0	200.0	204.0	2.0	1.0	3.960
	250	42	84	3.00	1.10	237.8	254.2	4000	5500	7228C	36228	385.2	508.4	3300	4400	7228CDB	7228CDF	7228CDT	154.0	236.0	243.0	2.5	1.0	8.600
	250	42	84	3.00	1.10	226.5	242.6	3400	4700	7228AC	46228	366.9	485.2	2800	3800	7228ACDB	7228ACDF	7228ACDT	154.0	236.0	243.0	2.5	1.0	8.780
	250	42	84	3.00	1.10	197.3	212.2	2300	3600	7228B	66228	319.6	424.4	2200	2900	7228BDB	7228BDF	7228BDT	154.0	236.0	243.0	2.5	1.0	8.900
	300	62	124	4.00	1.50	324.0	360.9	3500	4800	7328C	36328	524.9	721.8	2900	3800	7328CDB	7328CDF	7328CDT	158.0	282.0	291.5	3.0	1.5	20.100
	300	62	124	4.00	1.50	310.5	347.2	2800	3900	7328AC	46328	503.0	694.4	2300	3100	7328ACDB	7328ACDF	7328ACDT	158.0	282.0	291.5	3.0	1.5	21.500
	300	62	124	4.00	1.50	275.0	308.2	2100	3300	7328B	66328	445.5	616.4	2000	2600	7328BDB	7328BDF	7328BDT	158.0	282.0	291.5	3.0	1.5	22.440
150	225	35	70	2.10	1.10	150.9	168.1	4000	5600	7030C	36130	244.5	336.2	3400	4500	7030CDB	7030CDF	7030CDT	162.0	213.0	218.0	2.0	1.0	4.650
	225	35	70	2.10	1.10	142.5	159.3	3400	4800	7030AC	46130	230.9	318.6	2900	3800	7030ACDB	7030ACDF	7030ACDT	162.0	213.0	218.0	2.0	1.0	4.820
	270	45	90	3.00	1.10	270.3	303.7	3700	5100	7230C	36230	437.9	607.4	3100	4100	7230CDB	7230CDF	7230CDT	164.0	256.0	263.0	2.5	1.0	10.800
	270	45	90	3.00	1.10	257.5	289.4	3100	4400	7230AC	46230	417.2	578.8	2600	3500	7230ACDB	7230ACDF	7230ACDT	164.0	256.0	263.0	2.5	1.0	11.000
	270	45	90	3.00	1.10	224.6	253.9	2200	3400	7230B	66230	363.9	507.8	2000	2700	7230BDB	7230BDF	7230BDT	164.0	256.0	263.0	2.5	1.0	11.200
	320	65	130	4.00	1.50	342.5	401.1	3300	4500	7330C	36330	554.9	802.2	2700	3600	7330CDB	7330CDF	7330CDT	168.0	302.0	311.5	3.0	1.5	24.800
	320	65	130	4.00	1.50	327.5	382.9	2600	3700	7330AC	46330	530.6	765.8	2200	3000	7330ACDB	7330ACDF	7330ACDT	168.0	302.0	311.5	3.0	1.5	25.100
	320	65	130	4.00	1.50	288.8	339.8	2000	2600	7330B	66330	467.9	679.6	1600	2100	7330BDB	7330BDF	7330BDT	168.0	302.0	311.5	3.0	1.5	25.400
160	240	38	76	2.10	1.10	170.9	192.8	3700	5300	7032C	36132	276.9	385.6	3200	4200	7032CDB	7032CDF	7032CDT	172.0	228.0	233.0	2.0	1.0	5.820
	240	38	76	2.10	1.10	161.5	182.7	3200	4500	7032AC	46132	261.6	365.4	2700	3600	7032ACDB	7032ACDF	7032ACDT	172.0	228.0	233.0	2.0	1.0	5.960
	290	48	96	3.00	1.10	286.5	332.7	3500	4800	7232C	36232	464.1	665.4	2900	3800	7232CDB	7232CDF	7232CDT	174.0	276.0	283.0	2.5	1.0	13.500
	290	48	96	3.00	1.10	272.8	317.8	2900	4100	7232AC	46232	441.9	635.6	2500	3300	7232ACDB	7232ACDF	7232ACDT	174.0	276.0	283.0	2.5	1.0	13.700
	290	48	96	3.00	1.10	237.5	277.7	2000	2700	7232B	66232	384.8	555.4	1600	2200	7232BDB	7232BDF	7232BDT	174.0	276.0	283.0	2.5	1.0	13.900
	340	68	136	4.00	1.50	374.9	456.1	3100	4200	7332C	36332	607.3	912.2	2500	3400	7332CDB	7332CDF	7332CDT	178.0	322.0	331.5	3.0	1.5	29.700
	340	68	136	4.00	1.50	358.5	435.3	2500	3400	7332AC	46332	580.8	870.6	2000	2700	7332ACDB	7332ACDF	7332ACDT	178.0	322.0	331.5	3.0	1.5	29.800
	340	68	136	4.00	1.50	316.2	386.3	1800	2400	7332B	66332	512.2	772.6	1400	1900	7332BDB	7332BDF	7332BDT	178.0	322.0	331.5	3.0	1.5	29.900





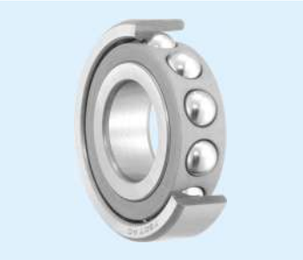
Single row　Back-to-back arrangement DB　Face-to-face arrangement DF　Tandem arrangement DT

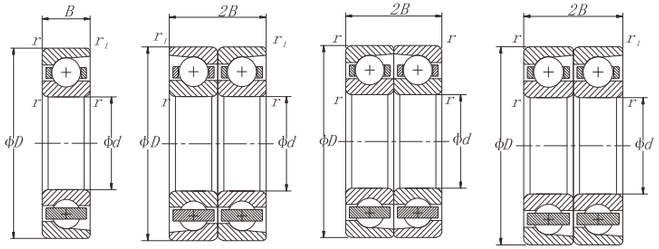


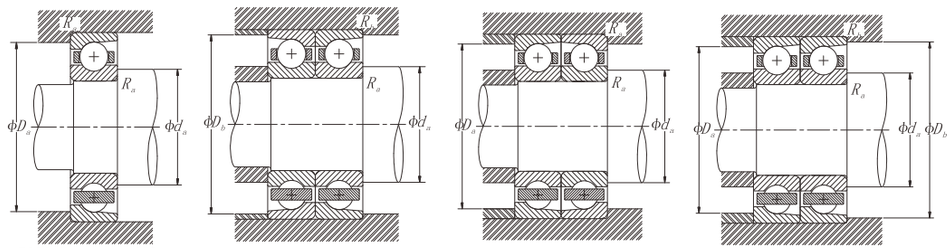
7000 C type α =15°
7000 AC type α =25°
7000 B type α =40°

d 170 mm

d	Boundary dimensions (mm) D	B	2B	r (Min)	r1 (Min)	Basic load ratings (kN) Cr	C0r	Limiting speeds (r/min) Grease	Oil	Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN) Cr	C0r	Limiting speeds (arrangement)(r/min) Grease	Oil	Nominal numbers Back-to-back	Face-to-face	Tandem	Mounting dimensions (mm) da Min	Da Max	Db Max	Ra Max	Rb Max	Reference mass (kg)
170	260	42	84	2.10	1.10	204.7	234.5	3500	4900	**7034C**	**36134**	331.6	469.0	2900	3900	**7034CDB**	**7034CDF**	**7034CDT**	182.0	248.0	253.0	2.0	1.0	7.800
	260	42	84	2.10	1.10	193.5	222.3	3000	4200	**7034AC**	**46134**	313.5	444.6	2500	3400	**7034ACDB**	**7034ACDF**	**7034ACDT**	182.0	248.0	253.0	2.0	1.0	7.960
	310	52	104	4.00	1.50	320.8	389.1	3200	4500	**7234C**	**36234**	519.7	778.2	2700	3600	**7234CDB**	**7234CDF**	**7234CDT**	188.0	292.0	301.5	3.0	1.5	16.900
	310	52	104	4.00	1.50	305.5	371.2	2800	3800	**7234AC**	**46234**	494.9	742.4	2300	3000	**7234ACDB**	**7234ACDF**	**7234ACDT**	188.0	292.0	301.5	3.0	1.5	17.000
	310	52	104	4.00	1.50	266.2	325.0	1900	2500	**7234B**	**66234**	431.2	650.0	1500	2000	**7234BDB**	**7234BDF**	**7234BDT**	188.0	292.0	301.5	3.0	1.5	17.100
	360	72	144	4.00	1.50	418.3	520.6	2900	4000	**7334C**	**36334**	677.6	1041.2	2400	3200	**7334CDB**	**7334CDF**	**7334CDT**	188.0	342.0	351.5	3.0	1.5	35.200
	360	72	144	4.00	1.50	400.9	500.5	2300	3200	**7334AC**	**46334**	649.5	1001.0	1900	2600	**7334ACDB**	**7334ACDF**	**7334ACDT**	188.0	342.0	351.5	3.0	1.5	35.300
	360	72	144	4.00	1.50	354.9	444.2	1700	2300	**7334B**	**66334**	574.9	888.4	1400	1800	**7334BDB**	**7334BDF**	**7334BDT**	188.0	342.0	351.5	3.0	1.5	35.400

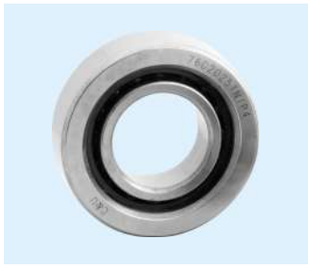


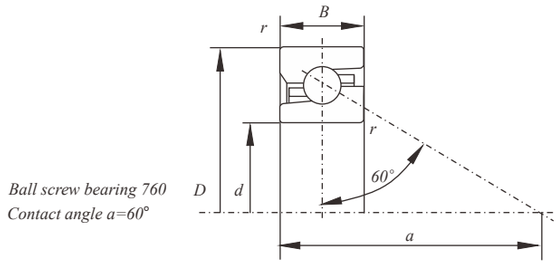


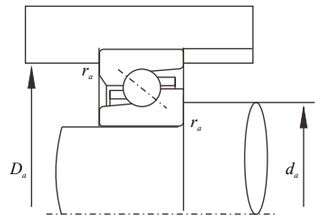


d 180~240mm

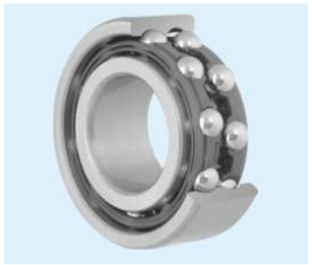
d	Boundary dimensions (mm) D	B	2B	r (Min)	r1 (Min)	Basic load ratings (kN) Cr	C0r	Limiting speeds (r/min) Grease	Oil	Nominal numbers	Nominal numbers (old)	Basic load ratings (arrangement)(kN) Cr	C0r	Limiting speeds (arrangement)(r/min) Grease	Oil	Nominal numbers Back-to-back	Face-to-face	Tandem	Mounting dimensions (mm) da Min	Da Max	Db Max	Ra Max	Rb Max	Reference mass (kg)
180	280	46	92	2.10	1.10	228.2	275.9	3200	4600	7036C	36136	369.7	551.8	2800	3700	7036CDB	7036CDF	7036CDT	192.0	268.0	273.0	2.0	1.0	10.40
	280	46	92	2.10	1.10	215.7	261.3	2800	3900	7036AC	46136	349.4	522.6	2300	3100	7036ACDB	7036ACDF	7036ACDT	192.0	268.0	273.0	2.0	1.0	10.40
	320	52	104	4.00	1.50	333.2	417.3	3100	4300	7236C	36236	539.8	834.6	2600	3400	7236CDB	7236CDF	7236CDT	198.0	302.0	311.5	3.0	1.5	17.70
	320	52	104	4.00	1.50	317.1	399.2	2600	3700	7236AC	46236	513.7	798.4	2200	3000	7236ACDB	7236ACDF	7236ACDT	198.0	302.0	311.5	3.0	1.5	17.70
	320	52	104	4.00	1.50	275.5	348.4	1700	2400	7236B	66236	446.3	696.8	1400	1900	7236BDB	7236BDF	7236BDT	198.0	302.0	311.5	3.0	1.5	17.70
	380	75	150	4.00	1.50	442.0	576.5	2700	3800	7336C	36336	716.0	1153.0	2300	3000	7336CDB	7336CDF	7336CDT	198.0	362.0	371.5	3.0	1.5	40.90
	380	75	150	4.00	1.50	422.9	550.3	2200	3100	7336AC	46336	685.1	1100.6	1900	2500	7336ACDB	7336ACDF	7336ACDT	198.0	362.0	371.5	3.0	1.5	40.90
	380	75	150	4.00	1.50	373.0	488.2	1600	2100	7336B	66336	604.3	976.4	1300	1700	7336BDB	7336BDF	7336BDT	198.0	362.0	371.5	3.0	1.5	40.90
190	290	46	92	2.10	1.10	246.6	306.6	3100	4400	7038C	36138	399.5	613.2	2600	3500	7038CDB	7038CDF	7038CDT	202.0	278.0	283.0	2.0	1.0	10.80
	290	46	92	2.10	1.10	233.2	290.6	2700	3800	7038AC	46138	377.8	581.2	2300	3000	7038ACDB	7038ACDF	7038ACDT	202.0	278.0	283.0	2.0	1.0	10.80
	340	55	110	4.00	1.50	344.6	449.8	2900	4100	7238C	36238	558.3	899.6	2500	3300	7238CDB	7238CDF	7238CDT	208.0	322.0	331.5	3.0	1.5	21.30
	340	55	110	4.00	1.50	327.0	427.4	2500	3500	7238AC	46238	529.7	854.8	2100	2800	7238ACDB	7238ACDF	7238ACDT	208.0	322.0	331.5	3.0	1.5	21.30
	340	55	110	4.00	1.50	283.7	373.8	1600	2300	7238B	66238	459.6	747.6	1400	1800	7238BDB	7238BDF	7238BDT	208.0	322.0	331.5	3.0	1.5	21.30
	400	78	156	5.00	2.00	484.8	643.2	2600	3600	7338C	36338	785.4	1286.4	2200	2900	7338CDB	7338CDF	7338CDT	212.0	378.0	390.0	4.0	2.0	47.00
	400	78	156	5.00	2.00	464.6	618.3	2100	2900	7338AC	46338	752.7	1236.6	1700	2300	7338ACDB	7338ACDF	7338ACDT	212.0	378.0	390.0	4.0	2.0	47.00
	400	78	156	5.00	2.00	411.3	548.7	1500	2000	7338B	66338	666.3	1097.4	1200	1600	7338BDB	7338BDF	7338BDT	212.0	378.0	390.0	4.0	2.0	47.00
200	310	51	102	2.10	1.10	264.6	340.4	2900	4100	7040C	36140	428.7	680.8	2500	3300	7040CDB	7040CDF	7040CDT	212.0	298.0	303.0	2.0	1.0	14.00
	310	51	102	2.10	1.10	250.1	322.5	2500	3500	7040AC	46140	405.2	645.0	2100	2800	7040ACDB	7040ACDF	7040ACDT	212.0	298.0	303.0	2.0	1.0	14.00
	360	58	116	4.00	1.50	368.5	489.9	2800	3900	7240C	36240	597.0	979.8	2300	3100	7240CDB	7240CDF	7240CDT	218.0	342.0	351.5	3.0	1.5	25.30
	360	58	116	4.00	1.50	350.0	466.4	2400	3300	7240AC	46240	567.0	932.8	2000	2600	7240ACDB	7240ACDF	7240ACDT	218.0	342.0	351.5	3.0	1.5	25.30
	360	58	116	4.00	1.50	303.9	407.9	1500	2100	7240B	66240	492.3	815.8	1300	1700	7240BDB	7240BDF	7240BDT	218.0	342.0	351.5	3.0	1.5	25.30
	420	80	160	5.00	2.00	512.2	711.0	2500	3400	7340C	36340	829.8	1422.0	2000	2700	7340CDB	7340CDF	7340CDT	222.0	398.0	410.0	4.0	2.0	53.10
	420	80	160	5.00	2.00	490.1	678.7	2000	2800	7340AC	46340	794.0	1357.4	1700	2200	7340ACDB	7340ACDF	7340ACDT	222.0	398.0	410.0	4.0	2.0	53.10
	420	80	160	5.00	2.00	432.5	602.0	1400	1900	7340B	66340	700.7	1204.0	1100	1500	7340BDB	7340BDF	7340BDT	222.0	398.0	410.0	4.0	2.0	53.10
220	340	56	112	3.00	3.00	311.5	430.5	2700	3800	7044C	36144	504.6	861.0	2300	3000	7044CDB	7044CDF	7044CDT	244.0	319.0	326.0	2.5	1.0	18.50
	340	56	112	3.00	3.00	294.5	407.8	2300	3200	7044AC	46144	477.1	815.6	1900	2600	7044ACDB	7044ACDF	7044ACDT	244.0	319.0	326.0	2.5	1.0	18.50
	400	65	130	4.00	1.50	445.4	633.6	2500	3500	7244C	36244	721.5	1267.2	2100	2800	7244CDB	7244CDF	7244CDT	248.0	374.0	383.0	3.0	1.5	36.50
	400	65	130	4.00	1.50	423.6	605.5	2100	3000	7244AC	46244	686.2	1211.0	1800	2400	7244ACDB	7244ACDF	7244ACDT	248.0	374.0	383.0	3.0	1.5	36.50
	400	65	130	4.00	1.50	368.1	528.8	1400	1900	7244B	66244	596.3	1057.6	1100	1500	7244BDB	7244BDF	7244BDT	248.0	374.0	383.0	3.0	1.5	36.50
	460	88	176	5.00	2.00	538.0	784.8	2300	3100	7344C	36344	871.6	1569.6	1900	2500	7344CDB	7344CDF	7344CDT	252.0	429.0	441.0	4.0	2.0	73.00
	460	88	176	5.00	2.00	513.5	752.8	1800	2500	7344AC	46344	831.9	1505.6	1500	2000	7344ACDB	7344ACDF	7344ACDT	252.0	429.0	441.0	4.0	2.0	73.00
	460	88	176	5.00	2.00	450.1	663.3	1300	1800	7344B	66344	729.2	1326.6	1100	1400	7344BDB	7344BDF	7344BDT	252.0	429.0	441.0	4.0	2.0	73.00
240	360	56	112	3.00	3.00	330.0	472.4	2500	3500	7048C	36148	534.6	944.8	2100	2800	7048CDB	7048CDF	7048CDT	265.0	339.0	345.0	2.5	1.0	19.50
	360	56	112	3.00	3.00	312.1	447.2	2100	3000	7048AC	46148	505.6	894.4	1800	2400	7048ACDB	7048ACDF	7048ACDT	265.0	339.0	345.0	2.5	1.0	19.50
	440	72	144	4.00	1.50	475.4	725.3	2300	3200	7248C	36248	770.1	1450.6	1900	2600	7248CDB	7248CDF	7248CDT	269.0	413.0	422.0	3.0	1.5	50.50
	440	72	144	4.00	1.50	450.8	688.4	1900	2700	7248AC	46248	730.3	1376.8	1600	2200	7248ACDB	7248ACDF	7248ACDT	269.0	413.0	422.0	3.0	1.5	50.50
	440	72	144	4.00	1.50	390.3	601.4	1300	1800	7248B	66248	632.3	1202.8	1100	1400	7248BDB	7248BDF	7248BDT	269.0	413.0	422.0	3.0	1.5	50.50
	500	95	190	5.00	2.00	615.0	947.0	2100	2800	7348C	36348	996.3	1894.0	1700	2200	7348CDB	7348CDF	7348CDT	273.0	468.0	480.0	4.0	2.0	92.30
	500	95	190	5.00	2.00	587.0	908.0	1700	2300	7348AC	46348	950.9	1816.0	1400	1800	7348ACDB	7348ACDF	7348ACDT	273.0	468.0	480.0	4.0	2.0	92.30
	500	95	190	5.00	2.00	515.1	801.0	1200	1600	7348B	66348	834.5	1602.0	980	1300	7348BDB	7348BDF	7348BDT	273.0	468.0	480.0	4.0	2.0	92.30

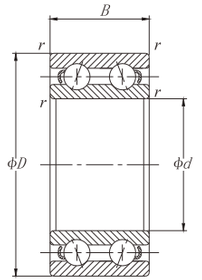


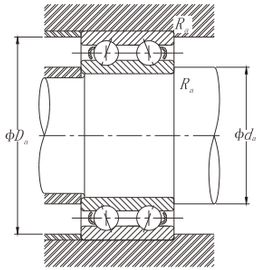




Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Mounting dimensions (mm)			Reference mass (kg)
d	D	B	2B	r (Min)	C_r	C_{0r}	Grease	Oil		d_a	D_a	r_{amax}	
12	32	10	20	0.60	11.60	12.50	8000	10000	**760201**	17.0	27.0	0.6	0.040
15	35	11	22	0.60	12.50	15.00	6000	8000	**760202**	20.5	30.0	0.6	0.050
17	40	12	24	0.60	16.60	20.00	6000	8000	**760203**	23.0	34.5	0.6	0.075
20	47	14	28	1.00	19.30	25.00	5000	6900	**760204**	27.5	39.5	1.0	0.120
	47	15	30	1.00	19.30	25.00	5000	6900	**760204X2**	27.5	39.5	1.0	0.130
	52	15	30	1.10	24.50	32.00	4500	6300	**760304**	30.5	43.5	1.1	0.170
25	52	15	30	1.00	22.00	30.50	4500	6300	**760205**	32.0	45.0	1.0	0.150
	62	15	30	1.00	28.50	41.50	3800	5300	**760305X2**	38.0	52.0	1.0	0.240
	62	17	34	1.10	28.50	41.50	3800	5300	**760305**	38.0	52.0	1.1	0.270
30	62	15	30	1.00	26.00	39.00	3800	5300	**760206X2**	39.5	52.5	1.0	0.220
	62	16	32	1.00	26.00	39.00	3800	5300	**760206**	39.5	52.5	1.0	0.230
	72	19	38	1.10	34.50	55.00	3200	4400	**760306**	45.0	61.0	1.1	0.400
35	72	15	30	1.00	30.00	50.00	3200	4400	**760207X2**	46.5	60.5	1.1	0.300
	72	17	34	1.10	30.00	50.00	3200	4400	**760207**	46.5	60.5	1.0	0.350
	80	21	42	1.50	36.50	61.00	3000	4200	**760307**	51.0	67.0	1.5	0.550
40	72	15	30	1.00	28.00	49.00	3000	4200	**760208X3**	49.0	62.5	1.1	0.260
	80	18	36	1.10	37.50	64.00	2800	3900	**760208**	53.5	69.5	1.1	0.450
	90	20	40	1.50	50.00	83.00	2600	3600	**760308X2**	56.5	75.5	1.5	0.650
	90	23	46	1.50	50.00	83.00	2600	3600	**760308**	56.5	75.5	1.5	0.750
45	75	15	30	1.00	28.50	52.00	2800	3900	**760209X3**	52.0	68.0	1.0	0.250
	85	19	38	1.10	38.00	68.00	2600	3600	**760209**	57.0	73.0	1.1	0.500
	100	20	40	1.50	58.50	104.00	2200	3100	**760309X2**	64.5	85.5	1.5	0.810
	100	25	50	1.50	58.50	104.00	2200	3100	**760309**	64.5	85.5	1.5	1.000
50	90	20	40	1.10	39.00	75.00	2400	3300	**760210**	63.0	79.0	1.1	0.550
	100	20	40	1.50	58.50	104.00	2200	3000	**760210X1**	64.5	85.5	1.5	0.750
	110	27	54	2.00	69.50	127.00	2000	2800	**760310**	72.0	94.0	2.0	1.300
55	100	21	42	1.50	40.50	81.50	2200	3000	**760211**	69.5	85.5	1.5	0.750
	120	20	40	2.00	60.00	116.00	1900	2600	**760311X2**	77.0	97.5	2.0	1.200
	120	29	58	2.00	78.00	146.00	1900	2600	**760311**	77.0	101.0	2.0	1.700
60	110	22	44	1.50	56.00	112.00	2000	2800	**760212**	77.0	96.0	1.5	0.950
	120	20	40	1.50	61.00	120.00	2000	2800	**760212X3**	79.5	100.5	1.5	1.100
	130	31	62	2.10	88.00	166.00	1800	2500	**760312**	82.5	107.5	2.1	2.100

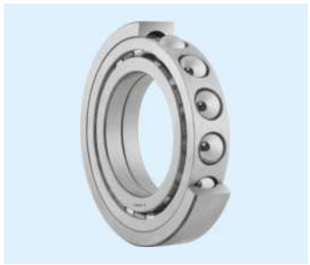


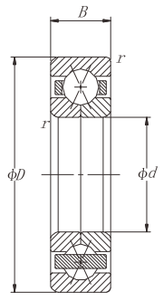


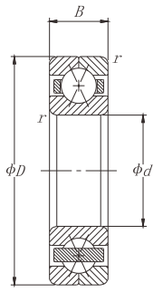


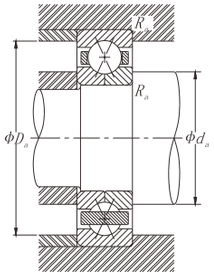
d 25~100 mm

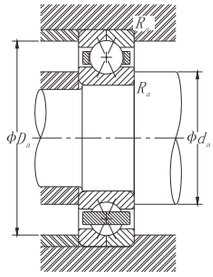
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Mounting dimensions (mm)			Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil			d_a Min	D_a Max	R_a Max	
25	52	20.6	1.0	20.6	16.3	7,300	9,800	**3205**	**3056205**	31.0	46.0	1.0	0.183
	62	25.4	1.1	28.9	19.4	6,700	8,900	**3305**	**3056305**	32.0	55.0	1.0	0.354
30	62	23.8	1.0	28.6	21.7	6,300	8,400	**3206**	**3056206**	36.0	56.0	1.0	0.303
	72	30.2	1.1	39.5	29.2	5,700	7,600	**3306**	**3056306**	37.0	65.0	1.0	0.558
35	72	27	1.1	31.57	24.5	5,500	7,400	**3207**	**3056207**	42.0	65.0	1.0	0.458
	80	34.9	1.5	49.5	37.4	5,000	6,600	**3307**	**3056307**	43.5	71.5	1.5	0.756
40	80	30.2	1.1	41.6	35.3	4,900	6,600	**3208**	**3056208**	47.0	73.0	1.0	0.627
	90	36.5	1.5	60.5	44.2	4,400	5,900	**3308**	**3056308**	48.5	81.5	1.5	1.030
45	85	30.2	1.1	44.3	35.8	4,400	5,900	**3209**	**3056209**	52.0	78.0	1.0	0.678
	100	39.7	1.5	72.4	54	4,000	5,300	**3309**	**3056309**	53.5	91.5	1.5	1.370
50	90	30.2	1.1	42.3	38.6	4,000	5,300	**3210**	**3056210**	57.0	83.0	1.0	0.698
	110	44.4	2.0	78.9	60.1	3,600	4,800	**3310**	**3056310**	60.0	100.0	2.0	1.980
55	100	33.3	1.5	56.9	47.9	3,600	4,900	**3211**	**3056211**	63.5	91.5	1.5	1.070
	120	49.2	2.0	92.09	75.25	3,300	4,400	**3311**	**3056311**	65.0	110.0	2.0	2.420
60	110	36.5	1.5	57.7	51.2	3,400	4,500	**3212**	**3056212**	68.5	101.5	1.5	1.340
	130	54	2.1	121.53	101.48	3,000	4,000	**3312**	**3056312**	72.0	118.0	2.0	3.070
65	120	38.1	1.5	73.5	66.6	3,100	4,200	**3213**	**3056213**	73.5	111.5	1.5	1.680
	140	58.7	2.1	129.6	103.6	2,800	3,700	**3313**	**3056313**	77.0	128.0	2.0	3.900
70	125	39.7	1.5	88.4	80	2,900	3,900	**3214**	**3056214**	78.5	116.5	1.5	1.840
	150	63.5	2.1	145	112	2,600	3,500	**3314**	**3056314**	82.0	138.0	2.0	5.200
75	130	41.3	1.5	91.3	84.5	2,700	3,600	**3215**	**3056215**	83.5	121.5	1.5	2.010
	160	68.3	2.1	176	140	2,400	3,200	**3315**	**3056315**	87.0	148.0	2.0	6.300
80	140	44.4	2.0	95.3	89.8	2,500	3,400	**3216**	**3056216**	90.0	130.0	2.0	2.710
85	150	49.2	2.0	124	110	2,400	3,200	**3217**	**3056217**	95.0	140.0	2.0	3.480
90	160	52.4	2.0	134.1	129.6	2,200	3,000	**3218**	**3056218**	100.0	150.0	2.0	4.240
95	170	55.6	2.1	163	184	2,100	2,800	**3219**	**3056219**	107.0	158.0	2.0	5.100
100	180	60.3	2.1	210	240	2,000	2,700	**3220**	**3056220**	112.0	168.0	2.0	5.880





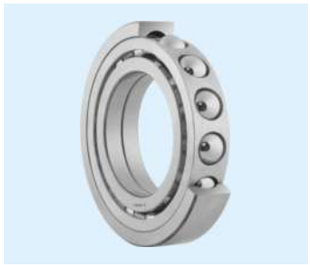


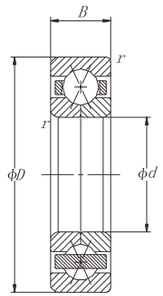


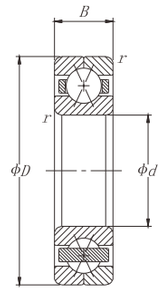


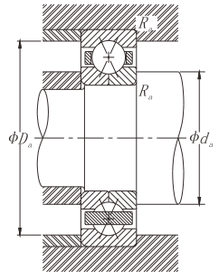
d 30~90 mm

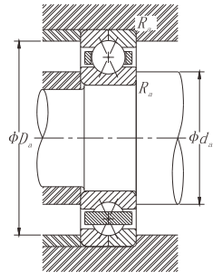
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions (mm)			Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil	QJ	QJF	176000	116000	d_a Min	D_a Max	R_a Max	
30	62	16	1.0	35.1	28.5	12,000	19,000	QJ206	QJF206	176206	116206	36.0	56.0	1.0	0.240
	72	19	1.1	49.4	38.0	10,000	17,000	QJ306	QJF306	176306	116306	37.0	65.0	1.0	0.420
35	72	17	1.1	46.2	39.0	10,000	17,000	QJ207	QJF207	176207	116207	42.0	65.0	1.0	0.350
	80	21	1.5	59.2	46.5	9,500	15,000	QJ307	QJF307	176307	116307	43.5	71.5	1.5	0.570
40	80	18	1.1	52.7	45.0	9,000	15,000	QJ208	QJF208	176208	116208	47.0	73.0	1.0	0.450
	90	23	1.5	71.5	58.5	8,500	14,000	QJ308	QJF308	176308	116308	48.5	81.5	1.5	0.780
45	85	19	1.1	58.5	51.0	8,500	14,000	QJ209	QJF209	176209	116209	52.0	78.0	1.0	0.520
	100	25	1.5	93.6	76.5	7,500	12,000	QJ309	QJF309	176309	116309	53.5	91.5	1.5	1.050
50	90	20	1.1	61.8	56.0	7,500	13,000	QJ210	QJF210	176210	116210	57.0	83.0	1.0	0.603
	110	27	2.0	111.0	91.5	6,700	11,000	QJ310	QJF310	176310	116310	60.0	100.0	2.0	1.380
55	100	21	1.5	79.3	76.5	7,000	11,000	QJ211	QJF211	176211	116211	63.5	91.5	1.5	0.780
	120	29	2.0	127.0	108.0	6,000	10,000	QJ311	QJF311	176311	116311	65.0	110.0	2.0	1.760
60	110	22	1.5	92.3	86.5	6,300	10,000	QJ212	QJF212	176212	116212	68.5	101.5	1.5	0.987
	130	31	2.1	146.0	125.0	5,600	9,000	QJ312	QJF312	176312	116312	72.0	118.0	2.0	2.180
65	120	23	1.5	104.0	104.0	5,600	9,500	QJ213	QJF213	176213	116213	73.5	111.5	1.5	1.240
	140	33	2.1	165.0	144.0	5,300	8,500	QJ313	QJF313	176313	116313	77.0	128.0	2.0	2.700
70	125	24	1.5	114.0	114.0	5,600	9,000	QJ214	QJF214	176214	116214	78.5	116.5	1.5	1.360
	150	35	2.1	186.0	166.0	4,800	8,000	QJ314	QJF314	176314	116314	82.0	138.0	2.0	3.270
75	130	25	1.5	117.0	122.0	5,300	8,500	QJ215	QJF215	176215	116215	83.5	121.5	1.5	1.530
	160	37	2.1	199.0	186.0	4,500	7,500	QJ315	QJF315	176315	116315	87.0	148.0	2.0	3.900
80	140	26	2.0	138.0	146.0	4,800	8,000	QJ216	QJF216	176216	116216	90.0	130.0	2.0	1.830
	170	39	2.1	216.0	208.0	4,300	7,000	QJ316	QJF316	176316	116316	92.0	158.0	2.0	4.640
85	150	28	2.0	148.0	160.0	4,500	7,500	QJ217	QJF217	176217	116217	95.0	140.0	2.0	2.300
	180	41	3.0	234.0	236.0	4,000	6,700	QJ317	QJF317	176317	116317	99.0	166.0	2.5	5.430
90	160	30	2.0	174.0	186.0	4,300	7,000	QJ218	QJF218	176218	116218	100.0	150.0	2.0	2.760
	190	43	3.0	265.0	285.0	3,800	6,300	QJ318	QJF318	176318	116318	104.0	176.0	2.5	6.310







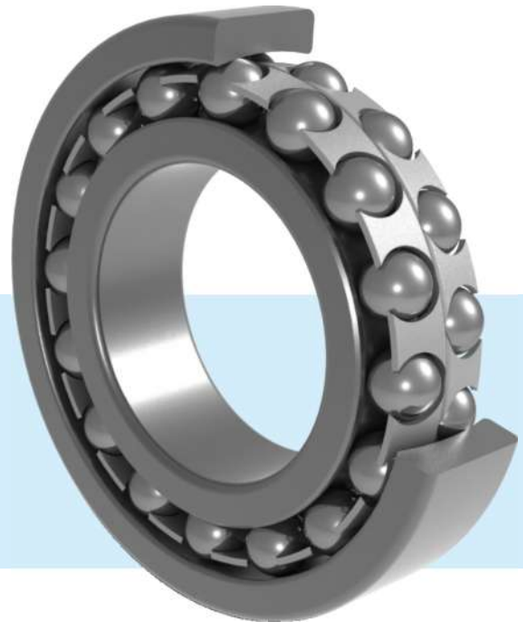




d **95~200mm**

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions (mm)			Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil	QJ	QJF	176000	116000	d_a Min	D_a Max	R_a Max	
95	170	32	2.1	199.0	212.0	4,000	6,700	**QJ219**	**QJF219**	**176219**	**116219**	107.0	158.0	2.0	3.350
	200	45	3.0	286.0	315.0	3,600	6,000	**QJ319**	**QJF319**	**176319**	**116319**	109.0	186.0	2.5	7.410
100	180	34	2.1	225.0	240.0	3,800	6,300	**QJ220**	**QJF220**	**176220**	**116220**	112.0	168.0	2.0	4.020
	215	47	3.0	307.0	340.0	3,400	5,600	**QJ320**	**QJF320**	**176320**	**116320**	114.0	201.0	2.5	9.140
105	190	36	2.1	245.0	400.0	3,600	6,000	**QJ221**	**QJF221**	**176221**	**116221**	117.0	178.0	2.0	4.750
	225	49	3.0	350.0	570.0	3,200	5,600	**QJ321**	**QJF321**	**176321**	**116321**	119.0	211.0	2.5	10.4
110	200	38	2.1	265.0	305.0	3,400	5,600	**QJ222**	**QJF222**	**176222**	**116222**	122.0	188.0	2.0	5.620
	240	50	3.0	390.0	475.0	3,000	4,800	**QJ322**	**QJF322**	**176322**	**116322**	124.0	226.0	2.5	12.0
120	215	40	2.1	286.0	340.0	3,200	5,000	**QJ224**	**QJF224**	**176224**	**116224**	132.0	203.0	2.0	6.750
	260	55	3.0	390.0	490.0	2,800	4,500	**QJ324**	**QJF324**	**176324**	**116324**	134.0	246.0	2.5	15.90
130	230	40	3	296.0	365.0	2,800	4,800	**QJ226**	**QJF226**	**176226**	**116226**	144.0	216.0	2.5	7.700
	280	58	4	423.0	560.0	2,600	4,000	**QJ326**	**QJF326**	**176326**	**116326**	148.0	262.0	3.0	19.0
140	250	42	3	325.0	440.0	2,600	4,300	**QJ228**	**QJF228**	**176228**	**116228**	154.0	236.0	2.5	9.800
	300	62	4	468.0	640.0	2,400	3,800	**QJ328**	**QJF328**	**176328**	**116328**	158.0	282.0	3.0	24.0
150	270	45	3	337.0	530.0	2,400	4,000	**QJ230**	**QJF230**	**176230**	**116230**	164.0	256.0	2.5	12.0
	320	65	4	494.0	710.0	2,200	3,600	**QJ330**	**QJF330**	**176330**	**116330**	168.0	302.0	3.0	29.0
160	290	48	48	423.0	620.0	2,200	3,800	**QJ232**	**QJF232**	**176232**	**116232**	206.0	243.0	2.0	15.500
	340	68	68	540.0	815.0	2,000	3,400	**QJ332**	**QJF332**	**176332**	**116332**	224.0	276.0	2.0	34.500
170	310	52	52	436.0	670.0	2,200	3,400	**QJ234**	**QJF234**	**176234**	**116234**	221.0	258.0	2.0	19.500
	360	72	72	618.0	965.0	1,900	3,200	**QJ334**	**QJF334**	**176334**	**116334**	237.0	293.0	2.0	41.500
180	320	52	52	449.0	710.0	2,000	3,400	**QJ236**	**QJF236**	**176236**	**116236**	231.0	269.0	2.0	20.500
	380	75	75	637.0	1020.0	1,800	3,000	**QJ336**	**QJF336**	**176336**	**116336**	252.0	309.0	2.0	47.500
190	400	78	78	702.0	1160.0	1,700	2,800	**QJ338**	**QJF338**	**176338**	**116338**	263.0	326.0	2.0	49.000
200	360	58	58	540.0	915.0	1,800	3,000	**QJ240**	**QJF240**	**176240**	**116240**	258.0	302.0	2.0	28.500

Self-aligning ball bearing



Self-aligning ball bearing

Self-aligning ball bearing

The raceway of the outer ring of self-aligning ball bearings is spherical, and the curvature center is aligned with the bearing center. Therefore, the inner ring, outer ring, balls and cage can incline at a certain degree and rotate freely around the bearing center. Its automatic self-aligning ability can correct the shaft or housing misalignment caused by improper processing and mounting automatically. It is applicable to occasions where shaft and housing is difficult to be aligned and shaft is prone to be deflected.

Self-aligning ball bearings are mostly used to bear radial load. However, when bearing radial load, it can also bear a small amount of axial load, but it is not suitable to bear pure axial load. Thanks to the self-aligning ability of this bearing, it is suitable for occasions with low speed and self-aligning requirements. If the loading capacity of the self-aligning ball bearing is not enough, the spherical roller bearing with the same self-aligning ability shall be used.

Application scope of self-aligning ball bearings: woodworking machinery and drive shaft of textile machinery.

The inner bore of the self-aligning ball bearing has cylindrical inner bore or tapered inner bore. The taper of tapered inner bore is 1:12 (suffix is K). C&U can provide self-aligning ball bearings with cylindrical bore or tapered bore on the inner diameter surface.

C&U can provide self-aligning ball bearings with seals, both sides of which are equipped with contact seals. The sealing lips contact the smooth bevel of the inner ring with light pressure.

The special bore tolerance of the self-aligning ball bearings with extended inner rings can facilitate the mounting and dismounting. If necessary, If necessary, please contact C&U.

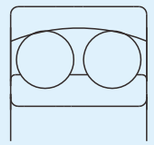
1. Structure Type

Normal type (Fig. 1):
Self-aligning ball bearing whose internal bore surface is cylindrical;

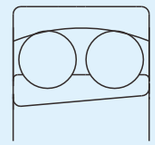
Tapered bore type (Fig. 2):
Self-aligning ball bearing whose internal bore surface is tapered. Taper is 1:12.

Closed type (Fig. 3):
Self-aligning ball bearing with seals on both sides.

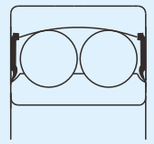
Wide inner ring type (Fig. 4):
Self-aligning ball bearings with extended inner ring.



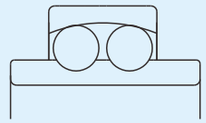
Normal type
(Fig. 1)



Tapered bore type
(Fig. 2)



Closed type
(Fig. 3)



Wide inner ring type
(Fig. 4)

2. Dimension accuracy & running accuracy

C&U can also provide self-aligning ball bearings with various accuracy grades above the standard grade. For the relevant dimension accuracy and running accuracy requirements, please refer to Section 5 for the technical clarification.

3. Radial clearance

C&U standard cylindrical bore self-aligning ball bearings adopt the standard clearance and the self-aligning ball bearings with taper inner bore take C3 clearance as the standard type. A clearance greater than or less than the standard group can also be provided according to user requirements. The radial clearance of the extended inner ring self-aligning ball bearing is between the C2 group and the standard group.

Please refer to Section 6 for the technical explanation for the radial clearance values of self-aligning ball bearings with cylindrical bores and tapered bores. These data are clearance values before bearing mounting without load.

4. Cage

The cage of self-aligning ball bearings generally uses stamping steel plate cage, or glass fiber reinforced nylon cage. If self-aligning ball bearings with nylon cages are required, please consult the technical center of C&U Group.

5. Allowable self-aligning angle

The internal structure design of self-aligning ball bearings enables its self-aligning function, which makes the bearings correct the angle alignment error between the inner and outer rings by themselves. Under normal load and working conditions, the misalignment angle values given in Table 1 are permitted when the inner ring is running. Whether or not this given value can be fully achieved also depends on the design of the bearing and the type of seal, etc.

6. Dynamic equivalent load

When $F_a/F_r<e$, $P=F_r+Y_1F_a$
When $F_a/F_r \geqslant e$, $P=0.65F_r+Y_2F_a$
The relevant calculating coefficient e, Y_1 and Y_2 for each bearing can be found in the specification table.

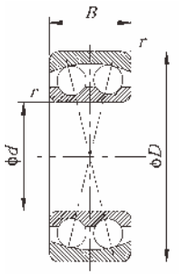
7. Static equivalent load

$$F_0=F_r+Y_0F_a$$

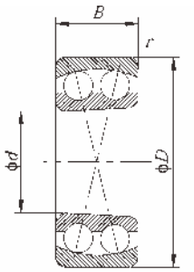
The coefficient value Y_0 for each bearing has been given in the specification table.

Table 1

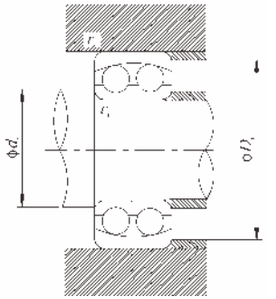
Bearing series	Allowable self-aligning angle
1200 series	2.5°
1300 series	3°
2200 series	2.5°
2300 series	3°



Cylindrical bore

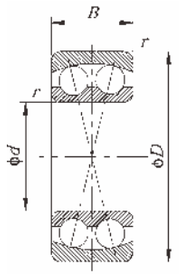


Tapered bore

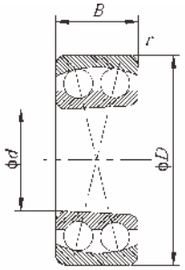


d 10~30 mm

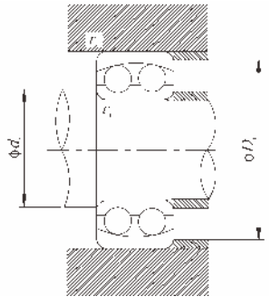
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers(old)		Mounting dimensions (mm)			Reference mass (kg)	Calculating coefficient			
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a Min	D_a Max	r_a Max		e	Y_1	Y_2	Y_0
10	30	9	0.6	5.53	1.18	24,000	30,000	1200	—	1200	111200	14.0	26.0	0.6	0.034	0.33	1.9	3	2
	30	14	0.6	8.06	1.73	22,000	28,000	2200	—	1500	—	14.0	26.0	0.6	0.047	0.54	1.15	1.8	1.3
	35	11	0.6	7.35	1.62	20,000	24,000	1300	1300K	1300	111300	14.0	31.0	0.6	0.057	0.35	2.8	1.8	1.9
	35	17	0.6	9.20	2.01	18,000	22,000	2300	—	1600	—	14.0	31.0	0.6	0.077	0.71	1.4	0.89	0.93
12	32	10	0.6	6.24	1.43	22,000	28,000	1201	1201K	1201	111201	16.0	28.0	0.6	0.040	0.33	1.9	3	2
	32	14	0.6	8.52	1.90	20,000	26,000	2201	—	1501	—	16.0	28.0	0.6	0.053	0.50	1.25	2	1.3
	37	12	1.0	9.36	2.16	18,000	22,000	1301	1301K	1301	111301	17.0	32.0	1.0	0.067	0.35	1.8	2.8	1.8
	37	17	1.0	11.70	2.70	17,000	20,000	2301	—	1601	—	17.0	32.0	1.0	0.095	0.60	1.05	1.6	1.1
15	35	11	0.6	7.41	1.76	19,000	24,000	1202	1202K	1202	111202	19.0	31.0	0.6	0.049	0.33	1.9	3	2
	35	14	0.6	8.71	2.04	18,000	22,000	2202	2202K	1502	111502	19.0	31.0	0.6	0.060	0.43	1.5	2.3	1.6
	42	13	1.0	10.80	2.60	17,000	20,000	1302	1302K	1302	111302	20.0	37.0	1.0	0.094	0.31	2	3.1	2.2
	42	17	1.0	11.90	2.90	15,000	18,000	2302	—	1602	—	20.0	37.0	1.0	0.110	0.52	1.2	1.9	1.3
17	40	12	0.6	8.84	2.20	18,000	22,000	1203	1203K	1203	111203	21.0	36.0	0.6	0.073	0.31	2	3.1	2.2
	40	16	0.6	10.60	2.55	17,000	20,000	2203	2203K	1503	111503	21.0	36.0	0.6	0.088	0.43	1.5	2.3	1.6
	47	14	1.0	12.70	3.40	14,000	17,000	1303	1303K	1303	111303	22.0	42.0	1.0	0.130	0.30	2.1	3.3	2.2
	47	19	1.0	14.60	3.55	13,000	16,000	2303	—	1603	—	22.0	42.0	1.0	0.160	0.52	1.2	1.9	1.3
20	47	14	1.0	12.70	3.40	15,000	18,000	1204	1204K	1204	111204	25.0	42.0	1.0	0.120	0.30	2.1	3.3	2.2
	47	18	1.0	16.80	4.15	14,000	17,000	2204	2204K	1504	111504	25.0	42.0	1.0	0.140	0.40	1.6	2.4	1.6
	52	15	1.1	14.30	4.00	12,000	15,000	1304	1304K	1304	111304	26.5	45.5	1.0	0.160	0.28	2.2	3.5	2.5
	52	21	1.1	18.20	4.75	11,000	14,000	2304	2304K	1604	111604	26.5	45.5	1.0	0.210	0.52	1.2	1.9	1.3
25	52	15	1.0	14.30	4.00	13,000	16,000	1205	1205K	1205	111205	30.0	47.0	1.0	0.140	0.28	2.2	3.5	2.5
	52	18	1.0	16.80	4.40	11,000	14,000	2205	2205K	1505	111505	30.0	47.0	1.0	0.160	0.35	1.8	2.8	1.8
	62	17	1.1	19.00	5.40	9,500	12,000	1305	1305K	1305	111305	31.5	55.5	1.0	0.260	0.28	2.2	3.5	2.5
	62	24	1.1	24.20	6.55	9,500	12,000	2305	2305K	1605	111605	31.5	55.5	1.0	0.340	0.48	1.3	2	1.4
30	62	16	1.0	15.60	4.65	10,000	13,000	1206	1206K	1206	111206	35.0	57.0	1.0	0.220	0.25	2.5	3.9	2.5
	62	20	1.0	23.80	6.70	9,500	12,000	2206	2206K	1506	111506	35.0	57.0	1.0	0.260	0.33	1.9	3	2



Cylindrical bore

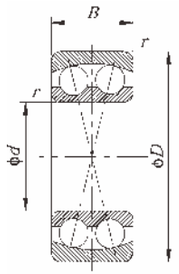


Tapered bore

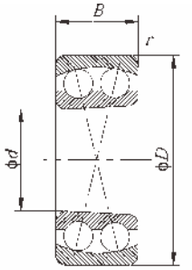


d 30~60 mm

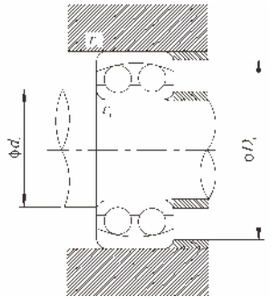
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers(old)		Mounting dimensions (mm)			Reference mass (kg)	Calculating coefficient			
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a Min	D_a Max	r_a Max		e	Y_1	Y_2	Y_0
30	72	19	1.1	22.50	6.80	9,000	11,000	1306	1306K	1306	111306	36.5	65.5	1.0	0.390	0.25	2.5	3.9	2.5
	72	27	1.1	31.20	8.80	8,500	10,000	2306	2306K	1606	111606	36.5	65.5	1.0	0.500	0.44	1.4	2.2	1.4
35	72	17	1.1	19.00	6.00	9,000	11,000	1207	1207K	1207	111207	41.5	65.5	1.0	0.320	0.23	2.7	4.2	2.8
	72	23	1.1	30.70	8.80	8,500	10,000	2207	2207K	1507	111507	41.5	65.5	1.0	0.400	0.31	2	3.1	2.2
	80	21	1.5	26.50	8.50	7,500	9,000	1307	1307K	1307	111307	43.0	72.0	1.5	0.510	0.25	2.5	3.9	2.5
	80	31	1.5	39.70	11.20	7,000	8,500	2307	2307K	1607	111607	43.0	72.0	1.5	0.680	0.46	1.35	2.1	1.4
40	80	18	1.1	19.90	6.95	8,500	10,000	1208	1208K	1208	111208	46.5	73.5	1.0	0.420	0.22	2.9	4.5	2.8
	80	23	1.1	31.90	10.00	7,500	9,000	2208	2208K	1508	111508	46.5	73.5	1.0	0.510	0.28	2.2	3.5	2.5
	90	23	1.5	33.80	11.20	6,700	8,000	1308	1308K	1308	111308	48.0	82.0	1.5	0.720	0.23	2.7	4.2	2.8
	90	33	1.5	54.00	16.00	6,300	7,500	2308	2308K	1608	111608	48.0	82.0	1.5	0.930	0.40	1.6	2.4	1.6
45	85	19	1.1	22.90	7.80	7,500	9,000	1209	1209K	1209	111209	51.5	78.5	1.0	0.470	0.21	3	4.6	3.2
	85	23	1.1	32.50	10.60	7,000	8,500	2209	2209K	1509	111509	51.5	78.5	1.0	0.550	0.26	2.4	3.7	2.5
	100	25	1.5	39.00	13.40	6,300	7,500	1309	1309K	1309	111309	53.0	92.0	1.5	0.960	0.23	2.7	4.2	2.8
	100	36	1.5	63.70	19.30	5,600	6,700	2309	2309K	1609	111609	53.0	92.0	1.5	1.250	0.33	1.9	3	2
50	90	20	1.1	26.50	9.15	7,000	8,500	1210	1210K	1210	111210	56.5	83.5	1.0	0.530	0.21	3	4.6	3.2
	90	23	1.1	33.80	11.20	6,300	7,500	2210	2210K	1510	111510	56.5	83.5	1.0	0.600	0.23	2.7	4.2	2.8
	110	27	2.0	43.60	14.00	5,600	6,700	1310	1310K	1310	111310	59.0	101.0	2.0	1.200	0.24	2.6	4.1	2.8
	110	40	2.0	63.70	20.00	5,300	6,300	2310	2310K	1610	111610	59.0	101.0	2.0	1.650	0.43	1.5	2.3	1.6
55	100	21	1.5	27.60	10.60	6,300	7,500	1211	1211K	1211	111211	63.0	92.0	1.5	0.710	0.19	3.3	5.1	3.6
	100	25	1.5	39.00	13.40	6,000	7,000	2211	2211K	1511	111511	63.0	92.0	1.5	0.810	0.23	2.7	4.2	2.8
	120	29	2.0	50.70	18.00	5,000	6,000	1311	1311K	1311	111311	64.0	111.0	2.0	1.600	0.23	2.7	4.2	2.8
	120	43	2.0	76.10	24.00	4,800	5,600	2311	2311K	1611	111611	64.0	111.0	2.0	2.100	0.40	1.6	2.4	1.6
60	110	22	1.5	31.20	12.20	5,600	6,700	1212	1212K	1212	111212	68.0	102.0	1.5	0.900	0.19	3.3	5.1	3.6
	110	28	1.5	48.80	17.00	5,300	6,300	2212	2212K	1512	111512	68.0	102.0	1.5	1.100	0.24	2.6	4.1	2.8
	130	31	2.1	58.50	22.00	4,500	5,300	1312	1312K	1312	111312	71.0	119.0	2.0	1.950	0.23	2.7	4.2	2.8
	130	46	2.1	87.10	28.50	4,500	5,300	2312	2312K	1612	111612	71.0	119.0	2.0	2.600	0.33	1.9	3	2



Cylindrical bore

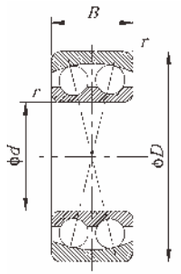


Tapered bore

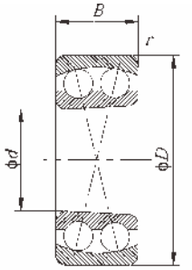


d 65~95 mm

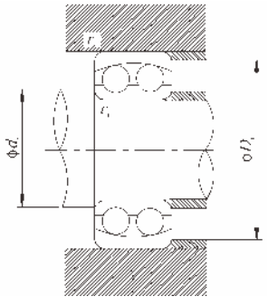
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers(old)		Mounting dimensions (mm)			Reference mass (kg)	Calculating coefficient			
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a Min	D_a Max	r_a Max		e	Y_1	Y_2	Y_0
65	120	23	1.5	35.10	14.00	5,300	6,300	1213	1213K	1213	111213	73.0	112.0	1.5	1.150	0.18	3.5	5.4	3.6
	120	31	1.5	57.20	20.00	5,000	6,000	2213	2213K	1513	111513	73.0	112.0	1.5	1.450	0.24	2.6	4.1	2.8
	140	33	2.1	65.00	25.50	4,300	5,000	1313	1313K	1313	111313	76.0	129.0	2.0	2.450	0.22	2.9	4.5	2.8
	140	48	2.1	95.60	32.50	4,000	4,800	2313	2313K	1613	111613	76.0	129.0	2.0	3.250	0.37	1.7	2.6	1.8
70	125	24	1.5	34.50	13.70	5,000	6,000	1214	1214K	1214	111214	78.0	117.0	1.5	1.250	0.18	3.5	5.4	3.6
	125	31	1.5	44.20	17.00	4,800	5,600	2214	2214K	1514	111514	78.0	117.0	1.5	1.500	0.27	2.3	3.6	2.5
	150	35	2.1	74.10	27.50	4,000	4,800	1314	1314K	1314	111314	81.0	139.0	2.0	3.000	0.22	2.9	4.5	2.8
	150	51	2.1	111.00	37.50	3,800	4,500	2314	2314K	1614	111614	81.0	139.0	2.0	3.900	0.37	1.7	2.6	1.8
75	130	25	1.5	39.00	15.60	4,800	5,600	1215	1215K	1215	111215	83.0	122.0	1.5	1.350	0.17	3.7	5.7	4
	130	31	1.5	44.20	18.00	4,500	5,300	2215	2215K	1515	111515	83.0	122.0	1.5	1.600	0.25	2.5	3.9	2.5
	160	37	2.1	79.30	30.00	3,800	4,500	1315	1315K	1315	111315	86.0	149.0	2.0	3.550	0.22	2.9	4.5	2.8
	160	55	2.1	124.00	43.00	3,400	4,000	2315	2315K	1615	111615	86.0	149.0	2.0	4.700	0.37	1.7	2.6	1.8
80	140	26	2.0	39.70	17.00	4,500	5,300	1216	1216K	1216	111216	89.0	131.0	2.0	1.650	0.16	3.9	6.1	4
	140	33	2.0	65.00	25.50	4,000	4,800	2216	2216K	1616	111516	89.0	131.0	2.0	2.000	0.22	2.9	4.5	2.8
	170	39	2.1	88.40	33.50	3,600	4,300	1316	1316K	1316	111316	91.0	159.0	2.0	4.200	0.22	2.9	4.5	2.8
	170	58	2.1	135.00	49.00	3,200	3,800	2316	2316K	1616	111616	91.0	159.0	2.0	6.100	0.37	1.7	2.6	1.8
85	150	28	2.0	48.80	20.80	4,000	4,800	1217	1217K	1217	111217	94.0	141.0	2.0	2.050	0.17	3.7	5.7	4
	150	36	2.0	58.50	23.60	3,800	4,500	2217	2217K	1517	111517	94.0	141.0	2.0	2.500	0.25	2.5	3.9	2.5
	180	41	3.0	97.50	38.00	3,400	4,000	1317	1317K	1317	111317	98.0	167.0	2.5	5.000	0.22	2.9	4.5	2.8
	180	60	3.0	140.00	51.00	3,000	3,600	2317	2317K	1617	111617	98.0	167.0	2.5	7.050	0.37	1.7	2.6	1.8
90	160	30	2.0	57.20	23.60	3,800	4,500	1218	1218K	1218	111218	99.0	151.0	2.0	2.500	0.17	3.7	5.7	4
	160	40	2.0	70.20	28.50	3,600	4,300	2218	2218K	1518	111518	99.0	151.0	2.0	3.400	0.27	2.3	3.6	2.5
	190	43	3.0	117.00	44.00	3,200	3,800	1318	1318K	1318	111318	103.0	177.0	2.5	5.800	0.22	2.9	4.5	2.8
	190	64	3.0	153.00	57.00	2,800	3,400	2318	2318K	1618	111618	103.0	177.0	2.5	8.450	0.37	1.7	2.6	1.8
95	170	32	2.1	63.70	27.00	3,600	4,300	1219	1219K	1219	111219	106.0	159.0	2.0	3.100	0.17	3.7	5.7	4
	170	43	2.1	83.20	34.50	3,400	4,000	2219	2219K	1519	111519	106.0	159.0	2.0	4.100	0.27	2.3	3.6	2.5



Cylindrical bore



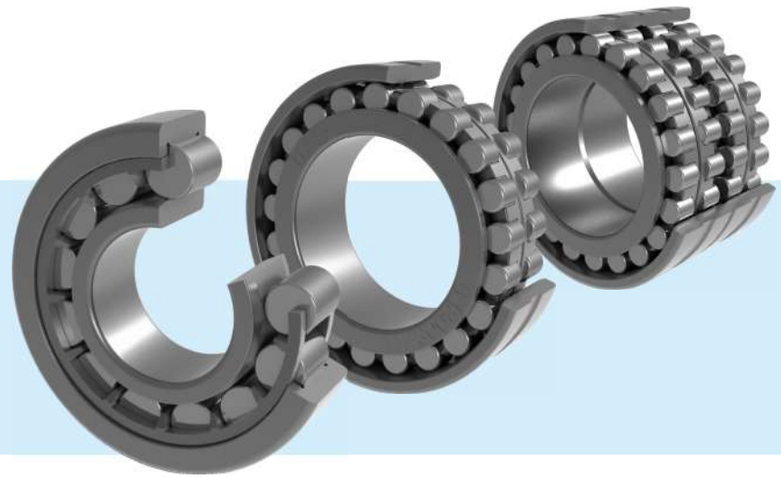
Tapered bore



d 95~110 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers(old)		Mounting dimensions (mm)			Reference mass (kg)	Calculating coefficient			
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a Min	D_a Max	r_a Max		e	Y_1	Y_2	Y_0
95	200	45	3.0	133.00	51.00	3,000	3,600	**1319**	**1319K**	**1319**	**111319**	108.0	187.0	2.5	6.700	0.23	2.7	4.2	2.8
	200	67	3.0	165.00	64.00	2,600	3,200	**2319**	**2319K**	**1619**	**111619**	108.0	187.0	2.5	9.800	0.37	1.7	2.6	1.8
100	180	34	2.1	68.90	30.00	3,400	4,000	**1220**	**1220K**	**1220**	**111220**	111.0	169.0	2.0	3.700	0.17	3.7	5.7	4
	180	46	2.1	97.50	40.50	3,200	3,800	**2220**	**2220K**	**1520**	**111520**	111.0	202.0	2.5	5.000	0.27	2.3	3.6	2.5
	215	47	3.0	143.00	57.00	2,800	3,400	**1320**	**1320K**	**1320**	**111320**	113.0	202.0	2.5	8.300	0.23	2.7	4.2	2.8
	215	73	3.0	190.00	80.00	2,400	3,000	**2320**	**2320K**	**1620**	**111620**	113.0	202.0	2.5	12.500	0.37	1.7	2.6	1.8
105	190	36	2.1	74.10	32.50	3,200	3,800	**1221**	**1221K**	**1221**	**111221**	116.0	179.0	2.0	4.350	0.17	3.7	5.7	4
	190	50	2.1	108.00	45.00	3,000	3,600	**2211**	**2211K**	**2211**	**112211**	116.0	179.0	2.0	6.100	0.28	2.2	3.5	2.5
	225	49	3.0	154.00	64.50	2,600	3,200	**1311**	**1311K**	**1311**	**111311**	118.0	212.0	2.5	10.000	0.23	2.7	4.2	2.8
	225	77	3.0	200.00	87.00	2,400	3,000	**2311**	**2311K**	**2311**	**112311**	118.0	212.0	2.5	14.400	0.37	1.7	2.6	1.8
110	200	38	2.1	88.40	39.00	3,000	3,600	**1222**	**1222K**	**1222**	**111222**	121.0	189.0	2.0	5.150	0.17	3.7	5.7	4
	200	53	2.1	124.00	52.00	2,800	3,400	**2222**	**2222K**	**2222**	**112222**	121.0	189.0	2.0	7.100	0.28	2.2	3.5	2.5
	240	50	3.0	163.00	72.00	2,400	3,000	**1322**	**1322K**	**1322**	**111322**	123.0	227.0	2.5	12.000	0.22	2.9	4.5	2.8
	240	80	3.0	216.00	95.00	2,200	2,800	**2322**	**2322K**	**2322**	**112322**	123.0	227.0	2.5	17.500	0.37	1.7	2.6	1.8
120	215	42	2.1	119	53	2800	4000	**1224**	**1224K**	—	—	149	190	2.1	6.75	0.19	3.3	5.1	3.6
130	230	46	3	127	58.5	2600	3600	**1226**	**1226K**	—	—	163	204	2.5	8.3	0.19	3.3	5.1	3.6
150	225	56	2.1	57.2	23.6	2400	3400	**13030**	**13030K**	—	—	175	203	2	7.5	0.24	2.6	4.1	2.8
180	280	74	2.1	95.6	40	2200	2800	**13036**	**13036K**	—	—	212	249	2	16	0.25	2.5	3.9	2.5
200	280	60	2.1	60.5	29	2000	2600	**13940**	**13940K**	—	—	229	258	2	10.7	0.19	3.3	5.1	3.6
220	300	60	2.1	60.5	30.5	1800	2400	**13944**	**13944K**	—	—	249	278	2	11	0.18	3.5	5.4	3.6
240	320	60	2.1	60.5	32	1600	2200	**13948**	**13948K**	—	—	269	298	2	11.3	0.16	3.9	6.1	4

Cylindrical roller bearing



Cylindrical roller bearing

Cylindrical roller bearing

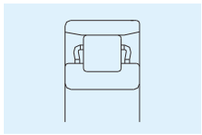
The rollers of cylindrical roller bearings are often guided by two ribs of a certain ring. The cage, roller and guide ring make up an assembly, which can be separated from another ring. As separable bearings, they are easy to mount and dismount. When interference fit is required for the inner/outer ring and the shaft/housing, their advantages are more obvious.

This type of bearing is often used to take radial load. Only single-row bearings with ribs on both inner and outer rings can take low constant axial load or high interval axial load.

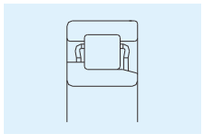
Compared with deep groove ball bearings of the same physical dimensions, this type of bearing's radial loading capacity is larger. The requirement for the machining accuracy of the shaft/housing bores for this type of bearing is higher.

1. Primary structure type

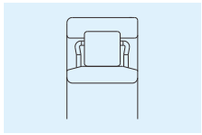
N type: outer ring without rib, inner ring with two ribs



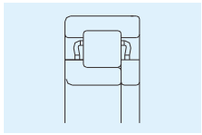
NJ type: outer ring with two ribs, inner ring with single rib



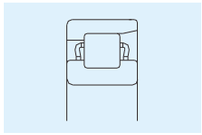
NU type: outer ring with two ribs, inner ring without rib



NUP type: outer ring with two ribs, inner ring with single rib and a plate



NF type: outer ring with single rib, inner ring with two ribs



The cages of bearings of the above structures often include: pressed steel, nylon, etc. Some models can be full of rollers without cages.

2. Allowable misalignment angle

Generally the shaft of the cylindrical roller bearing is not permitted to incline to the housing bore. However, when the load is light, the inner and outer rings of the single row cylindrical roller bearings are permitted to incline 2' mutually in axial direction. If the load is heavier, the permissible error is also larger, but is not permitted to exceed 4' .

3. Tolerance and clearance

As required, products of different class of tolerance can be provided. See Section 5 for the technical specification of the tolerance values.

4. Axial load capacity

For cylindrical roller bearings with ribs both on inner and outer rings, their axial load is related to the radial load they take and the lubricating methods. Maximum permitted axial load:

$F_{ap}=KC_{0r}((n_g-n)/(n_g+2n))$ Oil lubrication

$F_{ap}=KC_{0r}((n_g-2.5n)/(n_g+10n))$ Grease lubrication

$F_{ap}<0.4F_r$

In the equations:

F_{ap}: Maximum permitted axial load N

K: Coefficient related to the bearing dimension series

For 2, 3 series K=0.2

For 22, 33 series K=0.16

C_{0r}: static radial load rating of bearings N

n_g: the limiting speed when the bearing only takes radial load. When $F_r>0.1C_r$, the limiting speeds listed in the specification table shall be multiplied by the decreasing coefficient r/min.

n: bearing working speed r/min.

The axial load determined by the above formula can make Class 0 tolerance bearings (except improved and reinforced bearings) work normally in the following conditions:

Bearing temperature rise is 55°C for oil lubrication and 40 °C for grease lubrication. The bearing maximum temperature is 90 °C (the used lubricating oil viscosity is $V_{50}=30mm^2/s$ and the drop point of grease is 170 °C).

For interval axial load, the permitted axial load can be improved 1 time, and for transient one, it can be improved 2 times. According to the working conditions, single row cylindrical roller bearings with larger axial load capacity can be provided.

5. Dynamic equivalent radial load

$P_r=F_r$

For cylindrical roller bearings taking axial load

For 2, 3 series:

$P_r=F_r+0.3F_a$ $(0\leqslant F_a/F_r\leqslant 0.12)$

$P_r=0.94F_r+0.8F_a$ $(0.12\leqslant F_a/F_r\leqslant 0.3)$

For 22, 23 series:

$P_r=F_r+0.2F_a$ $(0\leqslant F_a/F_r\leqslant 0.18)$

$P_r=0.94F_r+0.53F_a$ $(0.18\leqslant F_a/F_r\leqslant 0.3)$

6. Static equivalent radial load

$P_{0r}=F_r$

Double row cylindrical roller bearing

Double row cylindrical roller bearings are featured by small cross section, high load capacity and rigidity. They are mainly used in machine tools, rolling mill necks, plastic rollers, grinders as well as large gear cases, etc.

C&U specializes in manufacturing NN type and NNU type double row cylindrical roller bearings. The rings and components of this type of bearings can be mounted separately. NNU type double row cylindrical roller bearings' outer rings, rollers and cage components can be mounted separately with its inner rings. Or all the parts can be mounted separately to facilitate the mounting, inspection and maintenance of bearings.

There are two types of the internal bores of double row cylindrical roller bearings: cylindrical bore and tapered bore. C&U provides both cylindrical bore and tapered bore type for NN and NNU bearings. When the bearings with tapered bores are mounted, a certain radial interior clearance or preload might be achieved.

The outer rings of some double row cylindrical roller bearings have lubricating grooves or oil holes, which both C&U are able to provide. If they are not listed in the dimension table, please consult the technical center of C&U Group.

1. Structure

(1) NN 0000 type (Fig. 1): inner ring with rib, outer ring without rib, cylindrical internal bore;

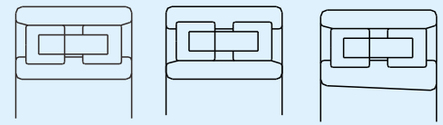
(2) NNU 0000 type (Fig. 2): inner ring without rib, outer ring with rib, cylindrical internal bore;

(3) NN 0000K type (Fig. 3): inner ring with rib, outer ring without rib, tapered internal bore, tapering 1:12;

(4) NNU 0000K type (Fig. 4): inner ring without rib, outer ring with rib, tapered internal bore, tapering 1:12;

(5) NN 0000/W33 type (Fig. 5): inner ring with rib, outer ring without rib, cylindrical internal bore, outer ring with lubricating groove and oil hole;

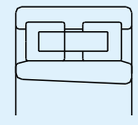
(6) NNU 0000/W33 type (Fig. 6): inner ring without rib, outer ring with rib, cylindrical internal bore; outer ring with lubricating groove and oil hole;



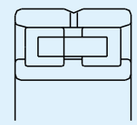
NN 0000 type (Fig. 1)

NNU 0000 type (Fig. 2)

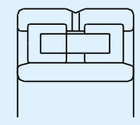
NN 0000K type (Fig. 3)



NNU 0000K type (Fig. 4)



NN 0000/W33 type (Fig. 5)



NNU 0000/W33 type (Fig. 6)

2. Dimension accuracy & running accuracy

See Chapter 5 for the technical specification for the requirements of dimension accuracy and running accuracy.

3. Radial clearance

See Chapter 5 for the technical specification of the radial clearance values of cylindrical bore bearings and tapered bore bearings. These data are the clearance values before the bearing mounting without preload.

4. Cage

Double row cylindrical roller bearings generally uses machined brass cages.

5. Dynamic equivalent load

$P=F_r$

6. Static equivalent load

$P_0=F_r$

Four-row cylindrical roller bearing

Four-row cylindrical roller bearings are known for their simple structure, high accuracy, high dynamic load rating, etc. However, they are incapable of taking axial load. Because the inner ring has no rib, the inner ring and outer ring with components can be mounted separately (with full set of roller and cage). Therefore, they are easy to mount and dismount, and are the first choice for various cold and hot rolling mills whose roll are frequently changed.

1. Structure

(1) FC type (Fig. 1): two outer rings with rib, full set of rollers and cage's outer ring components, and an inner ring:
(2) FCD type (Fig. 2): two outer rings with rib, full set of rollers and cage's outer ring components, and two inner rings;
(3) FCDP type (Fig. 3): outer ring with plate, and two inner rings.

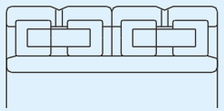


Fig. 1 FC type

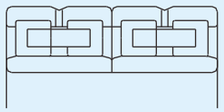


Fig. 2 FCD type

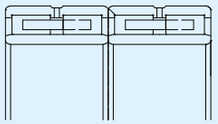


Fig. 3 FCDP type

2. Dimension accuracy & running accuracy

See Chapter 5 for the technical specification for requirements of dimensional accuracy and running accuracy of four-row cylindrical roller bearings.

3. Radial clearance

As radial support bearings of rolls, their working conditions are very severe. The actual working clearance depends on load, rotation speed, lubrication, temperature rise, design structure, fitting surface roughness and bearing bore diameter fitting interference. Proper radial clearance shall be selected according to specific circumstances.
C3 clearances are recommended for cold rolling mills or bearing bore diameter with small fitting interference. C4 clearances are recommended for hot rolling mills or bearing bore diameter with large fitting interference. See the technical specification details in Section 6.

4. Cage

Four-row cylindrical roller bearings generally use lathe machined brass cages.

5. Dynamic equivalent load

$P=F_r$

6. Static equivalent load

$P_0=F_r$

Split cylindrical roller bearing

It is difficult and inconvenient to handle, inspect and replace solid bearings for machines and equipment due to structural restriction, especially for large and oversize bearings.
The split bearings developed by C&U have solved this problem, and greatly facilitate the handling of bearings, and reduce the cost.

1. Application scope of split bearing

Split bearings can be used in all industrial fields, i.e. various crankshaft, multi-support axle, mandrel and major axis with several supporting points, etc., where bearing mountings are restricted.

- Cold bed for steel rolling
- Continuous caster
- Elevator and conveyer
- Material handling equipment
- Rotary furnace conveyance device
- Conveyance device
- Paper manufacturing machinery
- Rotary kiln driver

2. Advantages of split bearing compared to solid bearing

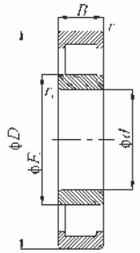
- Easy mounting
- Short machine stop time
- No need to dismount related devices

3. Structural features of split cylindrical roller bearings

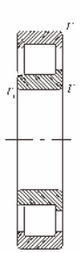
- Inner ring, outer ring and cage all consist of two split semicircle parts
- The internal bore is a cylindrical bore, which can be mounted on the axle directly.
- Able to substitute for solid bearing

4. Advanced technology of split cylindrical roller bearing

Split cylindrical roller bearing uses advanced bearing production technology to guarantee the safe running of bearings: finite element analysis, CAD optimum design, bearing structure parameters which can achieve maximum load rating, advanced cutting technology and cutting scheme, advanced heat treatment techniques to achieve fine internal quality, reliable joint, and excellent minimum fastener design.



NU type



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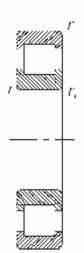

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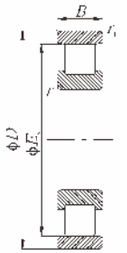

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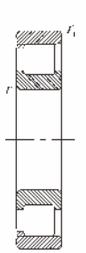

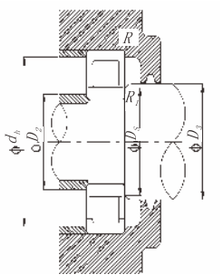

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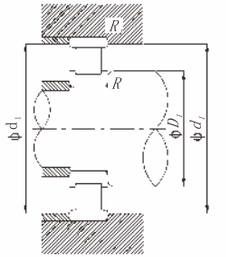
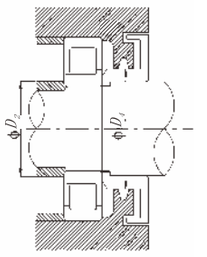
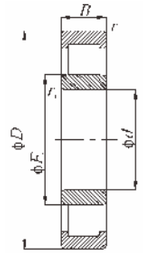




d **15~25 mm**

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers			Mounting dimensions (mm)										Reference mass (kg)
d	D	B	F_w	E_w	r (Min)	r_1 (Min)	C_r	C_{or}	Grease	Oil	NU type	NJ type	NUP type	N type	NF type	D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	
15	35	11	19.3	29.3	0.6	0.3	7.5	3.5	17,000	20,000	NU202	NJ202	—	N202	NF202	19	20	24	27	21	30	31	30	0.6	0.3	0.050
	35	11	19.3	30.3	0.6	0.3	11.5	9.5	15,000	19,000	NU202E	NJ202E	—	N202E	—	19	—	24	27	21	30	—	—	0.6	0.3	0.050
17	40	12	22.9	33.9	0.6	0.3	8.7	4.7	15,000	19,000	NU203	NJ203	NUP203	N203	NF203	21	20	25	28	24	35	36	35	0.6	0.3	0.090
	40	12	22.1	35.1	0.6	0.3	17.2	14.3	15,000	18,000	NU203E	NJ203E	NUP203E	N203E	—	21	—	25	28	24	35	—	—	0.6	0.3	0.090
	40	16	22.1	—	0.6	0.6	19.8	16.3	14,000	17,000	NU2203E	NJ2203E	NUP2203E	—	—	21	—	25	28	24	35	—	—	0.6	0.3	0.110
	47	14	24.2	40.2	1.1	0.6	19.2	15.3	14,000	17,000	NU303E	NJ303E	NUP303E	—	—	24	—	26	29	32	42	—	—	1	0.6	0.135
20	47	14	27.0	40.0	1.0	0.6	16.6	13.9	15,000	18,000	NU204	NJ204	NUP204	N204	NF204	24	25	26	29	32	42	43	42	1	0.6	0.111
	47	14	26.5	—	1.0	0.6	25.7	22.6	13,000	16,000	NU204E	NJ204E	NUP204E	—	—	24	—	26	29	32	42	—	—	1	0.6	0.122
	47	18	27.0	40.0	1.0	0.6	22.2	20.3	13,000	16,000	NU2204	NJ2204	NUP2204	N2204	—	24	25	26	29	32	42	43	42	1	0.6	0.143
	47	18	26.5	—	1.0	0.6	30.5	28.3	13,000	16,000	NU2204E	NJ2204E	NUP2204E	—	—	24	—	26	29	32	42	—	—	1	0.6	0.158
	52	15	28.5	44.5	1.1	0.6	23.1	19.2	12,000	15,000	NU304	NJ304	NUP304	N304	NF304	24	26.5	27	30	33	45.5	48	47	1	0.6	0.153
	52	15	27.5	—	1.1	0.6	31.5	26.9	12,000	15,000	NU304E	NJ304E	NUP304E	—	—	24	—	27	30	33	45.5	—	—	1	0.6	0.176
	52	21	28.5	44.5	1.1	0.6	33.0	30.0	11,000	14,000	NU2304	NJ2304	NUP2304	N2304	—	24	26.5	27	30	33	45.5	48	47	1	0.6	0.250
	52	21	27.5	—	1.1	0.6	42.0	39.0	11,000	14,000	NU2304E	NJ2304E	NUP2304E	—	—	24	—	27	30	33	45.5	—	—	1	0.6	0.240
25	47	12	30.5	41.5	0.6	0.3	15.1	14.1	15,000	18,000	NU1005	NJ1005	NUP1005	N1005	—	27	29	30	32	33	43	45	42.5	0.6	0.3	0.092
	52	15	32.0	45.0	1.0	0.6	18.8	17.0	13,000	16,000	NU205	NJ205	NUP205	N205	NF205	29	30	31	34	37	47	48	47	1	0.6	0.137
	52	15	31.5	—	1.0	0.6	29.3	27.7	12,000	14,000	NU205E	NJ205E	NUP205E	—	—	29	—	31	34	37	47	—	—	1	0.6	0.151
	52	18	32.0	45.0	1.0	0.6	25.1	24.7	12,000	14,000	NU2205	NJ2205	NUP2205	N2205	—	29	30	31	34	37	47	48	47	1	0.6	0.166
	52	18	31.5	—	1.0	0.6	35.0	34.5	12,000	14,000	NU2205E	NJ2205E	NUP2205E	—	—	29	—	31	34	37	47	—	—	1	0.6	0.186
	62	17	35.0	53.0	1.1	1.1	31.5	27.7	10,000	13,000	NU305	NJ305	NUP305	N305	NF305	31.5	31.5	33	37	40	55.5	55.5	55	1	1	0.241
	62	17	34.0	—	1.1	1.1	41.5	37.5	10,000	12,000	NU305E	NJ305E	NUP305E	—	—	31.5	—	33	37	40	55.5	—	—	1	1	0.275
	62	24	35.0	53.0	1.1	1.1	46.0	45.0	9,000	11,000	NU2305	NJ2305	NUP2305	N2305	—	31.5	31.5	33	37	40	55.5	55.5	55	1	1	0.343
	62	24	34.0	—	1.1	1.1	57.0	56.0	9,000	11,000	NU2305E	NJ2305E	NUP2305E	—	—	31.5	—	33	37	40	55.5	—	—	1	1	0.386
	80	21	38.8	62.8	1.5	1.5	46.5	40.0	9,000	11,000	NU405	NJ405	NUP405	N405	NF405	33	33	38	41	46	72	72	64	1.5	1.5	0.550



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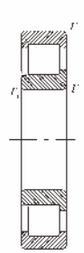

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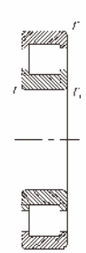

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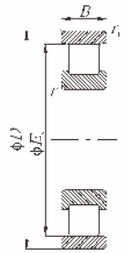

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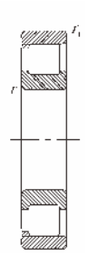

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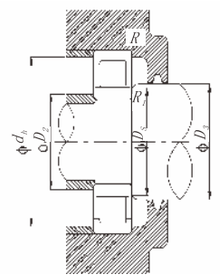
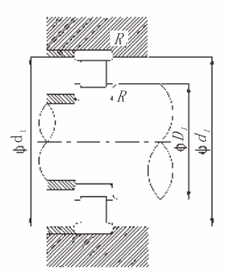
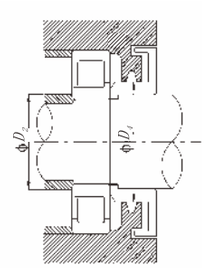
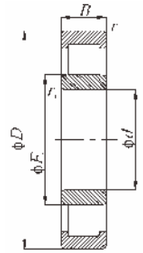






d 30~40 mm

d	Boundary dimensions (mm) D	B	F_w	E_w	r (Min)	r_1 (Min)	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Grease	Oil	Nominal numbers NU type	NJ type	Nominal numbers NUP type	N type	NF type	Mounting dimensions (mm) D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	Reference mass (kg)
30	55	13	36.5	48.5	1.0	0.6	19.7	19.6	12,000	15,000	NU1006	NJ1006	NUP1006	N1006	—	33	35	35	38	39.5	50	52	50	1	0.6	0.130
	62	16	38.5	53.5	1.0	0.6	24.9	23.3	11,000	13,000	NU206	NJ206	NUP206	N206	NF206	34	35	37	40	44	57	58	56	1	0.6	0.207
	62	16	37.5	—	1.0	0.6	39.0	37.5	11,000	13,000	NU206E	NJ206E	NUP206E	—	—	34	—	37	40	44	57	—	—	1	0.6	0.226
	62	20	38.5	53.5	1.0	0.6	35.0	36.0	10,000	12,000	NU2206	NJ2206	NUP2206	N2206	—	34	35	37	40	44	57	58	56	1	0.6	0.261
	62	20	37.5	—	1.0	0.6	49.0	50.0	9,500	12,000	NU2206E	NJ2206E	NUP2206E	—	—	34	—	37	40	44	57	—	—	1	0.6	0.297
	72	19	42.0	62.0	1.1	1.1	38.5	35.0	8,500	11,000	NU306	NJ306	NUP306	N306	NF306	36.5	36.5	40	44	48	65.5	66	64	1	1	0.358
	72	19	40.5	—	1.1	1.1	53.0	50.0	8,500	10,000	NU306E	NJ306E	NUP306E	—	—	36.5	—	40	44	48	65.5	—	—	1	1	0.398
	72	27	42.0	62.0	1.1	1.1	51.5	51.0	7,500	9,500	NU2306	NJ2306	NUP2306	N2306	—	36.5	36.5	40	44	48	65.5	66	64	1	1	0.513
	72	27	40.5	—	1.1	1.1	74.5	77.5	8,000	9,500	NU2306E	NJ2306E	NUP2306E	—	—	36.5	—	40	44	48	65.5	—	—	1	1	0.580
	90	23	45.0	73.0	1.5	1.5	62.5	55.0	7,500	9,500	NU406	NJ406	NUP406	N406	NF406	38	38	44	47	52	82	82	74	1.5	1.5	0.751
35	62	14	42.0	55.0	1.0	0.6	22.6	23.2	11,000	13,000	NU1007	NJ1007	NUP1007	N1007	—	38	40	41	44	45	57	59	56	1	0.6	0.179
	72	17	43.8	61.8	1.1	0.6	35.5	34.0	9,500	11,000	NU207	NJ207	NUP207	N207	NF207	39	41.5	43	46	50	65.5	68	64	1	0.6	0.295
	72	17	44.0	—	1.1	0.6	50.5	50.0	8,500	10,000	NU207E	NJ207E	NUP207E	—	—	39	—	43	46	50	65.5	—	—	1	0.6	0.327
	72	23	43.8	61.8	1.1	0.6	52.0	55.5	8,500	10,000	NU2207	NJ2207	NUP2207	N2207	—	39	41.5	43	46	50	65.5	68	64	1	0.6	0.404
	72	23	44.0	—	1.1	0.6	61.5	65.5	8,500	10,000	NU2207E	NJ2207E	NUP2207E	—	—	39	—	43	46	50	65.5	—	—	1	0.6	0.455
	80	21	46.2	68.2	1.5	1.1	49.5	47.0	8,000	9,500	NU307	NJ307	NUP307	N307	NF307	41.5	43	45	48	53	72	74	71	1.5	1	0.461
	80	21	46.2	—	1.5	1.1	71.0	71.0	7,500	9,500	NU307E	NJ307E	NUP307E	—	—	41.5	—	45	48	53	72	—	—	1.5	1	0.545
	80	31	46.2	68.2	1.5	1.1	64.5	65.5	7,100	8,500	NU2307	NJ2307	NUP2307	N2307	—	41.5	43	45	48	53	72	74	71	1.5	1	0.712
	80	31	46.2	—	1.5	1.1	99.0	109.0	6,700	8,500	NU2307E	NJ2307E	NUP2307E	—	—	41.5	—	45	48	53	72	—	—	1.5	1	0.780
	100	25	53.0	83.0	1.5	1.5	75.5	69.0	6,700	8,000	NU407	NJ407	NUP407	N407	NF407	43	43	52	55	61	92	92	84	1.5	1.5	0.990
40	68	15	47.0	61.0	1.0	0.6	27.3	29.0	10,000	12,000	NU1008	NJ1008	NUP1008	N1008	—	44	45	46	49	50.5	63	64	62	1	0.6	0.221
	80	18	50.0	70.0	1.1	1.1	43.5	42.0	8,500	10,000	NU208	NJ208	NUP208	N208	NF208	46.5	46.5	49	52	56	73.5	74	72	1	1	0.378
	80	18	49.5	—	1.1	1.1	55.5	55.5	8,500	10,000	NU208E	NJ208E	NUP208E	—	—	46.5	—	49	52	56	73.5	—	—	1	1	0.426
	80	23	50.0	70.0	1.1	1.1	58.0	62.0	7,500	9,000	NU2208	NJ2208	NUP2208	N2208	—	46.5	46.5	49	52	56	73.5	74	72	1	1	0.49
	80	23	49.5	—	1.1	1.1	72.5	77.5	7,500	9,000	NU2208E	NJ2208E	NUP2208E	—	—	46.5	—	49	52	56	73.5	—	—	1	1	0.552
	90	23	53.5	77.5	1.5	1.5	58.5	57.0	6,700	8,500	NU308	NJ308	NUP308	N308	NF308	48	48	51	55	60	82	82	80	1.5	1.5	0.658
	90	23	52.0	—	1.5	1.5	83.0	81.5	6,700	8,000	NU308E	NJ308E	NUP308E	—	—	48	—	51	55	60	82	—	—	1.5	1.5	0.754
	90	33	53.5	77.5	1.5	1.5	82.5	88.0	6,000	7,500	NU2308	NJ2308	NUP2308	N2308	—	48	48	51	55	60	82	82	80	1.5	1.5	0.951
	90	33	52.0	—	1.5	1.5	114.0	122.0	6,000	7,500	NU2308E	NJ2308E	NUP2308E	—	—	48	—	51	55	60	82	—	—	1.5	1.5	1.06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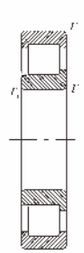
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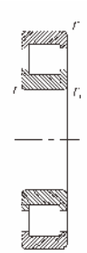
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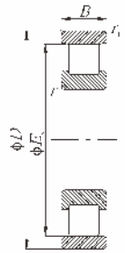
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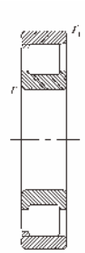
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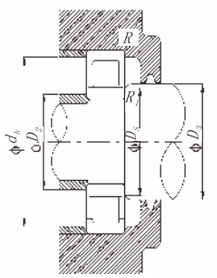
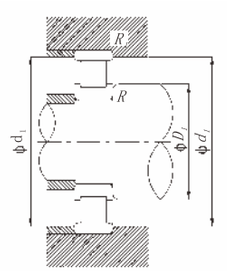
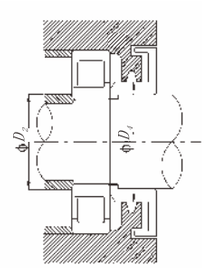
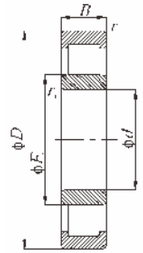






d 40~55 mm

d	Boundary dimensions (mm) D	B	F_w	E_w	r (Min)	r_1 (Min)	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Grease	Oil	Nominal numbers NU type	NJ type	Nominal numbers NUP type	N type	NF type	Mounting dimensions (mm) D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	Reference mass (kg)
40	110	27	58.0	92.0	2.0	2.0	100.8	95.4	6,000	7,500	NU408	NJ408	NUP408	N408	NF408	49	49	57	60	67	101	101	93	2	2	1.29
45	75	16	52.5	67.5	1.0	0.6	32.5	35.5	9,000	11,000	NU1009	NJ1009	NUP1009	N1009	—	49	50	52	54	56	70	71	69	1	0.6	0.282
	85	19	55.0	75.0	1.1	1.1	46.0	47.0	7,500	9,000	NU209	NJ209	NUP209	N209	NF209	51.5	51.5	54	57	61	78.5	79	77	1	1	0.432
	85	19	54.5	—	1.1	1.1	64.3	68.1	6,700	8,000	NU209E	NJ209E	NUP209E	—	—	51.5	—	54	57	61	78.5	—	—	1	1	0.496
	85	23	55.0	75.0	1.1	1.1	61.5	68.0	7,100	8,500	NU2209	NJ2209	NUP2209	N2209	—	51.5	51.5	54	57	61	78.5	79	77	1	1	0.531
	85	23	54.5	—	1.1	1.1	76.4	85.2	6,700	8,500	NU2209E	NJ2209E	NUP2209E	—	—	51.5	—	54	57	61	78.5	—	—	1	1	0.601
	100	25	58.5	86.5	1.5	1.5	74.0	71.0	6,300	7,500	NU309	NJ309	NUP309	N309	NF309	53	53	57	60	66	92	92	89	1.5	1.5	0.877
	100	25	58.5	—	1.5	1.5	94.7	98.3	6,000	7,500	NU309E	NJ309E	NUP309E	—	—	53	—	57	60	66	92	—	—	1.5	1.5	0.995
	100	36	58.5	86.5	1.5	1.5	99.0	104.0	5,600	6,700	NU2309	NJ2309	NUP2309	N2309	—	53	53	57	60	66	92	92	89	1.5	1.5	1.27
	100	36	58.5	—	1.5	1.5	137.0	153.0	5,300	6,700	NU2309E	NJ2309E	NUP2309E	—	—	53	—	57	60	66	92	—	—	1.5	1.5	1.41
	120	29	64.5	100.5	2.0	2.0	107.0	102.0	5,600	6,700	NU409	NJ409	NUP409	N409	NF409	54	54	63	66	74	111	111	102	2	2	1.62
50	80	16	57.5	72.5	1.0	0.6	32.0	36.0	8,000	10,000	NU1010	NJ1010	NUP1010	N1010	—	54	55	57	59	61	75	76	74	1	0.6	0.295
	90	20	60.4	80.4	1.1	1.1	48.0	51.0	7,100	8,500	NU210	NJ210	NUP210	N210	NF210	56.5	56.5	58	62	67	83.5	84	83	1	1	0.47
	90	20	59.5	—	1.1	1.1	68.7	75.8	6,300	7,500	NU210E	NJ210E	NUP210E	—	—	56.5	—	58	62	67	83.5	—	—	1	1	0.541
	90	23	60.4	80.4	1.1	1.1	64.0	73.5	6,300	8,000	NU2210	NJ2210	NUP2210	N2210	—	56.5	56.5	58	62	67	83.5	84	83	1	1	0.571
	90	23	59.5	—	1.1	1.1	77.8	88.9	6,300	8,000	NU2210E	NJ2210E	NUP2210E	—	—	56.5	—	58	62	67	83.5	—	—	1	1	0.652
	110	27	65.0	95.0	2.0	2.0	87.0	86.0	5,600	6,700	NU310	NJ310	NUP310	N310	NF310	59	59	63	67	73	101	101	98	2	2	1.14
	110	27	65.0	—	2.0	2.0	107.2	124.9	5,000	6,000	NU310E	NJ310E	NUP310E	—	—	59	—	63	67	73	101	—	—	2	2	1.31
	110	40	65.0	95.0	2.0	2.0	121.0	131.0	5,000	6,300	NU2310	NJ2310	NUP2310	N2310	—	59	59	63	67	73	101	101	98	2	2	1.68
	110	40	65.0	—	2.0	2.0	162.0	186.0	5,000	6,300	NU2310E	NJ2310E	NUP2310E	—	—	59	—	63	67	73	101	—	—	2	2	1.88
	130	31	70.8	110.8	2.1	2.1	139.0	136.0	5,000	6,000	NU410	NJ410	NUP410	N410	NF410	61	61	69	73	81	119	119	112	2	2	2.02
55	90	18	64.5	80.5	1.1	1.1	57.7	69.7	7,500	9,000	NU1011	NJ1011	NUP1011	N1011	—	60	61.5	63	66	68.5	83.5	85	82	1	1	0.442
	100	21	66.5	88.5	1.5	1.1	58.0	62.0	6,300	7,500	NU211	NJ211	NUP211	N211	NF211	61.5	63	65	68	73	92	94	91	1.5	1	0.638
	100	21	66.0	—	1.5	1.1	86.2	98.7	5,600	7,100	NU211E	NJ211E	NUP211E	—	—	61.5	—	65	68	73	92	—	—	1.5	1	0.718
	100	25	66.5	88.5	1.5	1.1	75.5	87.0	6,000	7,100	NU2211	NJ2211	NUP2211	N2211	—	61.5	63	65	68	73	92	94	91	1.5	1	0.773
	100	25	66.0	—	1.5	1.1	101.0	121.0	5,600	7,100	NU2211E	NJ2211E	NUP2211E	—	—	61.5	—	65	68	73	92	—	—	1.5	1	0.968
	120	29	70.5	104.5	2.0	2.0	137.0	143.0	5,000	6,300	NU311	NJ311	NUP311	N311	NF311	64	64	69	72	80	111	111	107	2	2	1.45
	120	29	70.5	—	2.0	2.0	138.5	144.4	4,500	5,600	NU311E	NJ311E	NUP311E	—	—	64	—	69	72	80	111	—	—	2	2	1.65



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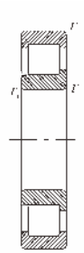

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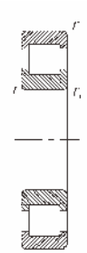

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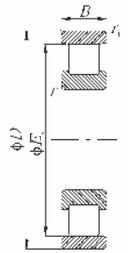

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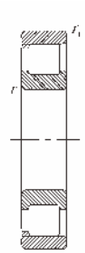

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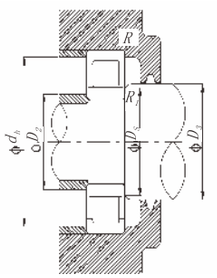
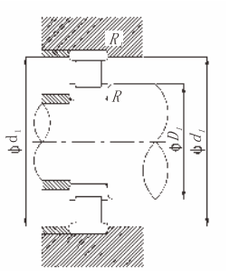
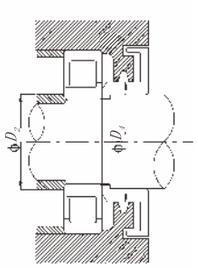
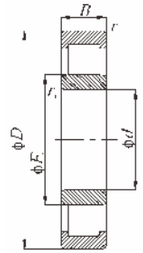






d 55~70 mm

d	Boundary dimensions (mm) D	B	F_w	E_w	r (Min)	r_1 (Min)	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Grease	Oil	Nominal numbers NU type	NJ type	Nominal numbers NUP type	N type	NF type	Mounting dimensions (mm) D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	Reference mass (kg)
55	120	43	70.5	104.5	2.0	2.0	148.0	162.0	4,500	5,600	NU2311	NJ2311	NUP2311	N2311	—	64	64	69	72	80	111	111	107	2	2	2.17
	120	43	70.5	—	2.0	2.0	201.0	233.0	4,500	5,600	NU2311E	NJ2311E	NUP2311E	—	—	64	—	69	72	80	111	—	—	2	2	2.37
	140	33	77.2	117.2	2.1	2.1	139.0	138.0	4,500	5,600	NU411	NJ411	NUP411	N411	NF411	66	66	76	79	87	129	129	109	2	2	2.48
60	95	18	69.5	85.5	1.1	1.1	40.0	48.5	6,700	8,500	NU1012	NJ1012	NUP1012	N1012	—	65	66.5	68	71	73.5	88.5	90	87	1	1	0.474
	110	22	73.5	97.5	1.5	1.5	72.0	80.0	6,000	7,100	NU212	NJ212	NUP212	N212	NF212	68	68	71	75	80	102	102	100	1.5	1.5	0.818
	110	22	72.0	—	1.5	1.5	97.5	107.0	5,300	6,300	NU212E	NJ212E	NUP212E	—	—	68	—	71	75	80	102	—	—	1.5	1.5	0.923
	110	28	73.5	97.5	1.5	1.5	101.0	123.0	5,300	6,300	NU2212	NJ2212	NUP2212	N2212	—	68	68	71	75	80	102	102	100	1.5	1.5	1.06
	110	28	72.0	—	1.5	1.5	131.0	157.0	5,300	6,300	NU2212E	NJ2212E	NUP2212E	—	—	68	—	71	75	80	102	—	—	1.5	1.5	1.21
	130	31	77.0	113.0	2.1	2.1	124.0	126.0	4,800	5,600	NU312	NJ312	NUP312	N312	NF312	71	71	75	79	86	119	119	116	2	2	1.82
	130	31	77.0	—	2.1	2.1	150.0	157.0	4,300	5,000	NU312E	NJ312E	NUP312E	—	—	71	—	75	79	86	119	—	—	2	2	2.05
	130	46	77.0	113.0	2.1	2.1	169.0	188.0	4,300	5,300	NU2312	NJ2312	NUP2312	N2312	—	71	71	75	79	86	119	119	116	2	2	2.71
	130	46	77.0	—	2.1	2.1	222.0	262.0	4,300	5,300	NU2312E	NJ2312E	NUP2312E	—	—	71	—	75	79	86	119	—	—	2	2	2.96
	150	35	83.0	127.0	2.1	2.1	167.0	168.0	4,300	5,300	NU412	NJ412	NUP412	N412	NF412	71	71	82	85	94	139	139	128	2	2	3.02
65	100	18	74.5	90.5	1.1	1.0	41.0	51.0	6,300	8,000	NU1013	NJ1013	NUP1013	N1013	—	70	71.5	73	76	78.5	93.5	95	92	1	1	0.485
	120	23	79.6	105.6	1.5	1.5	84.0	94.5	5,300	6,300	NU213	NJ213	NUP213	N213	NF213	73	73	77	81	87	112	112	108	1.5	1.5	1.02
	120	23	78.5	—	1.5	1.5	108.0	119.0	4,800	5,600	NU213E	NJ213E	NUP213E	—	—	73	—	77	81	87	112	—	—	1.5	1.5	1.21
	120	31	79.6	105.6	1.5	1.5	120.0	149.0	4,800	6,000	NU2213	NJ2213	UP2213	N2213	—	73	73	77	81	87	112	112	108	1.5	1.5	1.41
	120	31	78.5	—	1.5	1.5	149.0	181.0	4,800	6,000	NU2213E	NJ2213E	NUP2213E	—	—	73	—	77	81	87	112	—	—	1.5	1.5	1.62
	140	33	83.5	121.5	2.1	2.1	135.0	139.0	4,300	5,300	NU313	NJ313	NUP313	N313	NF313	76	76	81	85	93	129	129	125	2	2	2.23
	140	33	82.5	—	2.1	2.1	181.0	191.0	4,000	4,800	NU313E	NJ313E	NUP313E	—	—	76	—	81	85	93	129	—	—	2	2	2.54
	140	48	83.5	121.5	2.1	2.1	188.0	212.0	3,800	4,800	NU2313	NJ2313	NUP2313	N2313	—	76	76	81	85	93	129	129	125	2	2	3.27
	140	48	82.5	—	2.1	2.1	248.0	287.0	3,800	4,800	NU2313E	NJ2313E	NUP2313E	—	—	76	—	81	85	93	129	—	—	2	2	3.48
	160	37	89.3	135.3	2.1	2.1	195.0	203.0	4,000	4,800	NU413	NJ413	NUP413	N413	NF413	76	76	88	91	100	149	149	137	2	2	3.61
70	110	20	80.0	100.0	1.1	1.0	58.5	70.5	6,000	7,100	NU1014	NJ1014	NUP1014	N1014	—	75	76.5	78	82	85	103.5	105	101	1	1	0.699
	125	24	84.5	110.5	1.5	1.5	87.5	101.0	5,000	6,300	NU214	NJ214	NUP214	N214	NF214	78	78	82	86	92	117	117	114	1.5	1.5	1.12
	125	24	83.5	—	1.5	1.5	119.0	137.0	4,500	5,600	NU214E	NJ214E	NUP214E	—	—	78	—	82	86	92	117	—	—	1.5	1.5	1.32
	125	31	84.5	110.5	1.5	1.5	125.0	160.0	4,500	5,600	NU2214	NJ2214	NUP2214	N2214	—	78	78	82	86	92	117	117	114	1.5	1.5	1.47
	125	31	83.5	—	1.5	1.5	156.0	194.0	4,500	5,600	NU2214E	NJ2214E	NUP2214E	—	—	78	—	82	86	92	117	—	—	1.56	1.56	1.71
	150	35	90.0	130.0	2.1	2.1	158.0	168.0	4,000	5,000	NU314	NJ314	NUP314	N314	NF314	81	81	87	92	100	139	139	134	2	2	2.71



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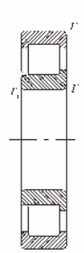

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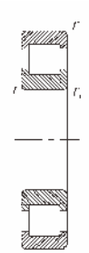

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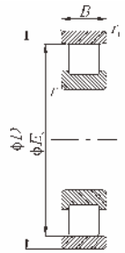

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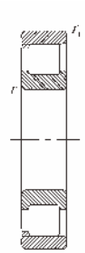

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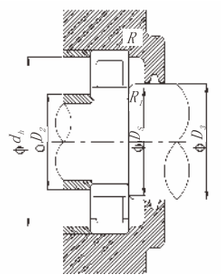
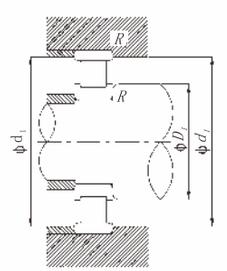
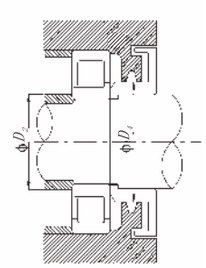
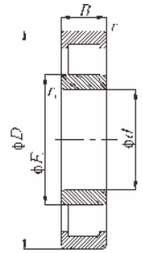






d 70~85 mm

d	Boundary dimensions (mm) D	B	F_w	E_w	r (Min)	r_1 (Min)	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Grease	Oil	Nominal numbers NU type	NJ type	Nominal numbers NUP type	N type	NF type	Mounting dimensions (mm) D_5 Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	Reference mass (kg)
70	150	35	89.0	—	2.1	2.1	205.0	222.0	3,600	4,300	NU314E	NJ314E	NUP314E	—	—	81	—	87	92	100	139	—	—	2	2	3.11
	150	51	90.0	130.0	2.1	2.1	223.0	262.0	3,600	4,500	NU2314	NJ2314	NUP2314	N2314	—	81	81	87	92	100	139	139	134	2	2	3.98
	150	51	89.0	—	2.1	2.1	274.0	325.0	3,600	4,500	NU2314E	NJ2314E	NUP2314E	—	—	81	—	87	92	100	139	—	—	2	2	4.25
	180	42	100.0	152.0	3.0	3.0	243.0	257.0	3,600	4,300	NU414	NJ414	NUP414	N414	NF414	83	83	99	102	112	167	167	153	2.5	2.5	5.24
75	115	20	85.0	105.0	1.1	1.0	60.0	74.5	5,600	6,700	NU1015	NJ1015	NUP1015	N1015	—	80	81.5	83	87	90	108.5	110	106	1	1	0.738
	130	25	88.5	116.5	1.5	1.5	101.0	118.0	4,800	6,000	NU215	NJ215	NUP215	N215	NF215	83	83	87	90	96	122	122	120	1.5	1.5	1.23
	130	25	88.5	—	1.5	1.5	130.0	156.0	4,300	5,300	NU215E	NJ215E	NUP215E	—	—	83	—	87	90	96	122	—	—	1.5	1.5	1.41
	130	31	88.5	116.5	1.5	1.5	136.0	172.0	4,300	5,300	NU2215	NJ2215	NUP2215	N2215	—	83	83	87	90	96	122	122	120	1.5	1.5	1.55
	130	31	88.5	—	1.5	1.5	162.0	207.0	4,300	5,300	NU2215E	NJ2215E	NUP2215E	—	—	83	—	87	90	96	122	—	—	1.5	1.5	1.79
	160	37	95.5	139.5	2.1	2.1	190.0	205.0	3,800	4,800	NU315	NJ315	NUP315	N315	NF315	86	86	93	97	106	149	149	143	2	2	3.28
	160	37	95.0	—	2.1	2.1	240.0	263.0	3,400	4,000	NU315E	NJ315E	NUP315E	—	—	86	—	93	97	106	149	—	—	2	2	3.74
	160	55	95.5	139.5	2.1	2.1	274.0	325.0	3,400	4,300	NU2315	NJ2315	NUP2315	N2315	—	86	86	93	97	106	149	149	143	2	2	4.87
	160	55	95.0	—	2.1	2.1	330.0	295.0	3,400	4,300	NU2315E	NJ2315E	NUP2315E	—	—	86	—	93	97	106	149	—	—	2	2	5.25
	190	45	104.5	160.5	3.0	3.0	262.0	274.0	3,400	4,000	NU415	NJ415	NUP415	N415	NF415	88	88	103	107	118	177	177	162	2.5	2.5	6.22
80	125	22	91.5	113.5	1.1	1.0	72.5	90.5	5,300	6,300	NU1016	NJ1016	NUP1016	N1016	—	85	86.5	90	94	97	118.5	120	115	1	1	0.98
	140	26	95.3	125.3	2.0	2.0	111.0	130.0	4,500	5,300	NU216	NJ216	NUP216	N216	NF216	89	89	94	97	104	131	131	128	2	2	1.52
	140	26	95.3	—	2.0	2.0	139.0	167.0	4,000	4,800	NU216E	NJ216E	NUP216E	—	—	89	—	94	97	104	131	—	—	2	2	1.67
	140	33	95.3	125.3	2.0	2.0	154.0	198.0	4,000	5,000	NU2216	NJ2216	NUP2216	N2216	—	89	89	94	97	104	131	131	128	2	2	1.93
	140	33	95.3	—	2.0	2.0	186.0	243.0	4,000	5,000	NU2216E	NJ2216E	NUP2216E	—	—	89	—	94	97	104	131	—	—	2	2	2.12
	170	39	103.0	147.0	2.1	2.1	201.0	223.0	3,600	4,300	NU316	NJ316	NUP316	N316	NF316	91	91	99	105	114	159	159	151	2	2	3.86
	170	39	101.0	—	2.1	2.1	256.0	282.0	3,200	3,800	NU316E	NJ316E	NUP316E	—	—	91	—	99	105	114	159	—	—	2	2	4.22
	170	58	103.0	147.0	2.1	2.1	274.0	330.0	3,200	4,000	NU2316	NJ2316	NUP2316	N2316	—	91	91	99	105	114	159	159	151	2	2	5.79
	170	58	101.0	—	2.1	2.1	355.0	430.0	3,200	4,000	NU2316E	NJ2316E	NUP2316E	—	—	91	—	99	105	114	159	—	—	2	2	6.25
	200	48	110.0	170.0	3.0	3.0	299.0	315.0	3,200	3,800	NU416	NJ416	NUP416	N416	NF416	93	93	109	112	124	187	187	172	2.5	2.5	7.32
85	130	22	96.5	118.5	1.1	1.0	74.5	95.5	5,000	6,000	NU1017	NJ1017	NUP1017	N1017	—	90	91.5	95	99	102	123.5	125	120	1	1	1.03
	150	28	101.8	133.8	2.0	2.0	126.0	149.0	4,300	5,000	NU217	NJ217	NUP217	N217	NF217	94	94	99	104	110	141	141	137	2	2	1.87
	150	28	100.5	—	2.0	2.0	167.0	199.0	3,800	4,500	NU217E	NJ217E	NUP217E	—	—	94	—	99	104	110	141	—	—	2	2	2.11
	150	36	101.8	133.8	2.0	2.0	178.0	232.0	3,800	4,500	NU2217	NJ2217	NUP2217	N2217	—	94	94	99	104	110	141	141	137	2	2	2.44



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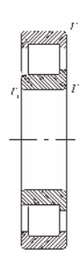

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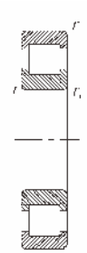

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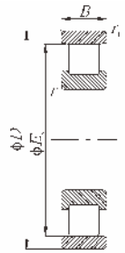

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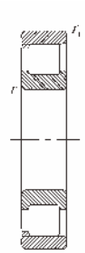

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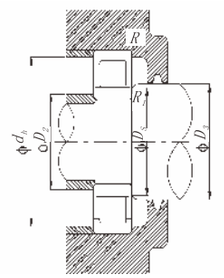
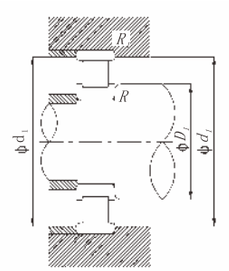
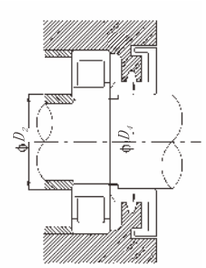
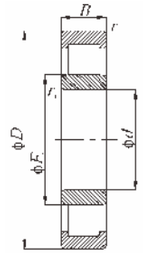






d 85~100mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers			Mounting dimensions (mm)										Reference mass (kg)
d	D	B	F_w	E_w	r (Min)	r_1 (Min)	C_r	C_{0r}	Grease	Oil	NU type	NJ type	NUP type	N type	NF type	D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	
85	150	36	100.5	—	2.0	2.0	214.7	274.1	3800	4500	NU2217E	NJ2217E	NUP2217E	—	—	94	—	99	104	110	141	—	—	2	2	2.67
	180	41	108.0	156.0	3.0	3.0	212	228	3400	4000	NU317	NJ317	NUP317	N317	NF317	98	98	106	110	119	167	167	160	2.5	2.5	4.54
	180	41	108.0	—	3.0	3.0	295	336	3000	3600	NU317E	NJ317E	NUP317E	—	—	98	—	106	110	119	167	—	—	2.5	2.5	4.81
	180	60	108.0	156.0	3.0	3.0	315	380	3000	3800	NU2317	NJ2317	NUP2317	N2317	—	98	98	106	110	119	167	167	160	2.5	2.5	6.7
	180	60	108.0	—	3.0	3.0	393	485	3000	3600	NU2317E	NJ2317E	NUP2317E	—	—	98	—	106	110	119	167	—	—	2.5	2.5	7.16
	210	52	113.0	177.0	4.0	4.0	335	350	3000	3800	NU417	NJ417	NUP417	N417	NF417	101	101	111	115	128	194	194	179	3	3	9.41
90	140	24	103.0	127.0	1.5	1.1	88	114	4500	5600	NU101018	NJ1018	NUP1018	N1018	—	96.5	98	101	106	109	132	134	129	1.5	1	1.33
	160	30	107.0	143.0	2.0	2.0	152	178	4000	4800	NU218	NJ218	NUP218	N218	N218	99	99	105	109	116	151	151	146	2	2	2.29
	160	30	107.0	—	2.0	2.0	182	217	3600	4300	NU218E	NJ218E	NUP218E	—	—	99	—	105	109	116	151	—	—	2	2	2.44
	160	40	107.0	143.0	2.0	2.0	207	265	3600	4300	NU2218	NJ2218	NUP2218	N2218	—	99	99	105	109	116	151	151	146	2	2	3.09
	160	40	107.0	—	2.0	2.0	233	298	3600	4300	NU2218E	NJ2218E	NUP2218E	—	—	99	—	105	109	116	151	—	—	2	2	3.33
	190	43	115.0	165.0	3.0	3.0	240	265	3200	3800	NU318	NJ318	NUP318	N318	N318	103	103	111	117	127	177	177	169	2.5	2.5	5.31
	190	43	113.5	—	3.0	3.0	323	360	2800	3400	NU318E	NJ318E	NUP318E	—	—	103	—	111	117	127	177	—	—	2.5	2.5	5.72
	190	64	115.0	165.0	3.0	3.0	325	395	2800	3600	NU2318	NJ2318	NUP2318	N2318	—	103	103	111	117	127	177	177	169	2.5	2.5	7.95
	190	64	113.5	—	3.0	3.0	435	535	2800	3400	NU2318E	NJ2318E	NUP2318E	—	—	103	—	111	117	127	177	—	—	2.5	2.5	8.56
	225	54	123.5	191.5	4.0	4.0	375	400	2800	3400	NU418	NJ418	NUP418	N418	NF418	106	106	122	125	139	209	209	194	3	3	11.2
95	145	24	108.0	132.0	1.5	1.1	90.5	120	4300	5300	NU1019	NJ1019	NUP1019	N1019	—	101.5	103	106	111	114	137	139	134	1.5	1	1.42
	170	32	113.5	151.5	2.1	2.1	158	183	3800	4500	NU219	NJ219	NUP219	N219	NF219	106	106	111	116	123	159	159	155	2	2	2.78
	170	32	112.5	—	2.1	2.1	226	274	3400	4000	NU219E	NJ219E	NUP209E	—	—	106	—	111	116	123	159	—	—	2	2	3.02
	170	43	113.5	151.5	2.1	2.1	230	298	3400	4000	NU2219	NJ2219	NUP2219	N2219	—	106	—	111	116	123	159	159	155	2	2	3.79
	170	43	112.5	—	2.1	2.1	284.4	368	3400	4000	NU2219E	NJ2219E	NUP2219E	—	—	106	—	111	116	123	159	—	—	2	2	4.14
	200	45	121.5	173.5	3.0	3.0	259	289	3000	3600	NU319	NJ319	NUP319	N319	NF319	108	108	119	124	134	187	187	178	2.5	2.5	6.13
	200	45	121.5	—	3.0	3.0	338	392	2600	3200	NU319E	NJ319E	NUP319E	—	—	108	—	119	124	134	187	—	—	2.5	2.5	6.62
	200	67	121.5	173.5	3.0	3.0	370	460	2600	3400	NU2319	NJ2319	NUP2319	N2319	—	108	108	119	124	134	187	187	178	2.5	2.5	9.21
	200	67	121.5	—	3.0	3.0	468.9	585.9	2600	3200	NU2319E	NJ2319E	NUP2319E	—	—	108	—	119	124	134	187	—	—	2.5	2.5	9.81
	240	55	133.5	201.5	4.0	4.0	400	445	2600	3200	NU419	NJ419	NUP419	N419	NF419	111	111	132	136	149	224	224	204	3	3	13.2
100	150	24	113.0	137.0	1.5	1.5	93	126	4300	5300	NU1020	NJ1020	NUP1020	N1020	—	106.5	108	111	116	119	142	144	139	1.5	1	1.45
	180	34	120.0	160.0	2.1	2.1	183	217	3600	4300	NU220	NJ220	NUP220	N220	NF220	111	111	117	122	130	169	169	164	2	2	3.33
	180	34	119.0	—	2.1	2.1	250	305	3200	3800	NU220E	NJ220E	NUP220E	—	—	111	—	117	122	130	169	—	—	2	2	3.66



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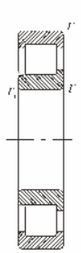

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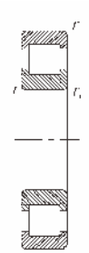

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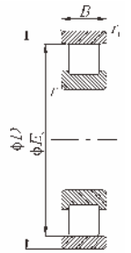

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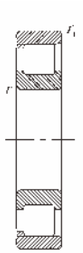

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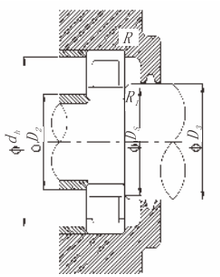
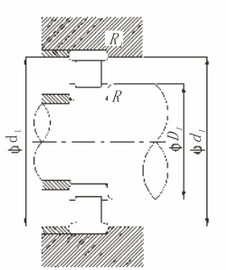
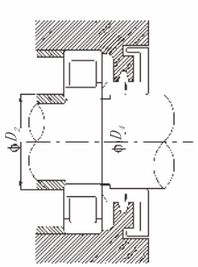
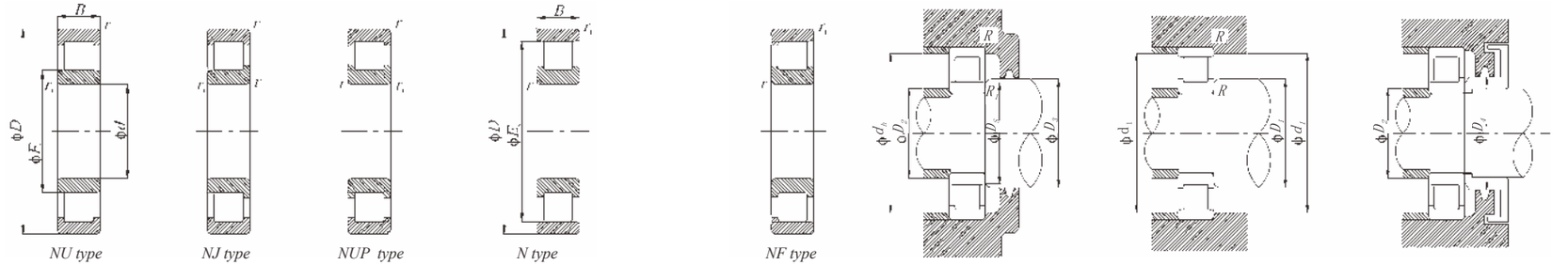






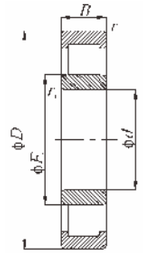
d 100~120 mm

Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers			Mounting dimensions (mm)										Reference mass (kg)
d	D	B	F_w	E_w	r (Min)	r_1 (Min)	C_r	C_{0r}	Grease	Oil	NU type	NJ type	NUP type	N type	NF type	D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	
100	180	46	120.0	160.0	2.1	2.1	246	315	3200	3800	NU2220	NJ2220	NUP2220	N2220	—	111	111	117	122	130	169	169	164	2	2	4.57
	180	46	119.0	—	2.1	2.1	335	445	3200	3800	NU2220E	NJ2220E	NUP2220E	—	—	111	—	117	122	130	169	—	—	2	2	5.01
	215	47	129.5	185.5	3.0	3.0	299	335	2800	3400	NU320	NJ320	NUP320	N320	NF320	113	113	125	132	143	202	202	190	2.5	2.5	7.49
	215	47	127.5	—	3.0	3.0	390	440	2400	3000	NU320E	NJ320E	NUP320E	—	—	113	—	125	132	143	202	—	—	2.5	2.5	8.57
	215	73	129.5	185.5	3.0	3.0	410	505	2400	3200	NU2320	NJ2320	NUP2320	N2320	—	113	113	125	132	143	202	202	190	2.5	2.5	11.7
	215	73	127.5	—	3.0	3.0	569	715	2400	3000	NU2320E	NJ2320E	NUP2320E	—	—	113	—	125	132	143	202	—	—	2.5	2.5	12.8
	250	58	139.0	211.0	4.0	4.0	450	500	2600	3000	NU420	NJ420	NUP420	N420	NF420	116	116	137	141	156	234	234	213	3	3	14.9
105	160	26	119.5	145.5	2.0	2.0	141	198	4000	4800	NU1021	NJ1021	NUP1021	N1021	—	111.5	114	118	122	126	151	154	148	2	1	1.84
	190	36	126.8	168.8	2.1	2.1	248.4	308.6	3400	4000	NU221	NJ221	NUP221	N221	NF221	116	116	124	129	137	179	179	173	2	2	3.95
	225	49	135.0	195.0	3.0	3.0	407	452	2600	3200	NU321	NJ321	NUP321	N321	NF321	118	118	132	137	149	212	212	199	2.5	2.5	8.53
	260	60	144.5	220.5	4.0	4.0	532	606	2400	3000	NU421	NJ421	NUP421	N421	NF421	121	121	143	147	162	244	244	223	3	3	16.6
110	170	28	125.0	155.0	2.0	2.0	160	226	3800	4500	NU1022	NJ1022	NUP1022	N1022	—	116.5	119	124	128	132	161	164	157	2	1	2.33
	200	38	132.5	178.5	2.1	2.1	229	272	3200	3800	NU222	NJ222	NUP222	N2220	NF222	121	121	130	135	144	189	189	182	2	2	4.63
	200	38	132.5	—	2.1	2.1	296	371	2800	3400	NU222E	NJ222E	NUP222E	—	—	121	—	130	135	144	189	—	—	2	2	4.27
	200	53	132.5	178.5	2.1	2.1	320	415	2800	3400	NU2222	NJ2222	NUP2222	N2222	—	121	121	130	135	144	189	189	182	2	2	6.56
	200	53	132.5	—	2.1	2.1	382	514	2800	3400	NU2222E	NJ2222E	NUP2222E	—	—	121	—	130	135	144	189	—	—	2	2	7.41
	240	50	143.0	207.0	3.0	3.0	450	525	2200	2800	NU322	NJ322	NUP322	N322	NF322	123	123	140	145	158	227	227	211	2.5	2.5	10.1
	240	50	143.0	—	3.0	3.0	450	525	2200	2800	NU322E	NJ322E	NUP322E	—	—	123	123	140	145	158	227	—	—	2.5	2.5	11.1
	240	80	143.0	207.0	3.0	3.0	570	735	2200	2800	NU2322	NJ2322	NUP2322	N2322	—	123	123	140	145	158	227	227	211	2.5	2.5	17.1
	240	80	143.0	—	3.0	3.0	675	880	2200	2800	NU2322E	NJ2322E	NUP2322E	—	—	123	—	140	145	158	227	—	—	2.5	2.5	19.4
	280	65	155.0	235.0	4.0	4.0	550	620	2200	2800	NU422	NJ422	NUP422	N422	NF422	126	126	153	157	173	264	264	237	3	3	21.1
120	180	28	135.0	165.0	2.0	2.0	164	237	3400	4300	NU1024	NJ1024	NUP1024	N1024	—	126.5	129	134	138	142	171	174	167	2	1	2.44
	215	40	143.5	191.5	2.1	2.1	248	299	3000	3400	NU224	NJ224	NUP224	N224	NF224	131	131	141	146	156	204	204	196	2	2	5.57
	215	40	143.5	—	2.1	2.1	342	433	2600	3200	NU224E	NJ224E	NUP224E	—	—	131	—	141	146	156	204	—	—	2	2	5.97
	215	58	143.5	191.5	2.1	2.1	350	460	2600	3200	NU2224	NJ2224	NUP2224	N2224	—	131	131	141	146	156	204	204	196	2	2	8.19
	215	58	143.5	—	2.1	2.1	396	549	2600	3200	NU2224E	NJ2224E	NUP2224E	—	—	131	—	141	146	156	204	—	—	2	2	9.18
	260	55	154.0	226.0	3.0	3.0	450	510	2000	2800	NU324	NJ324	NUP324	N324	NF324	133	133	151	156	171	247	247	230	2.5	2.5	12.8



d 120~150 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers			Mounting dimensions (mm)										Reference mass (kg)
d	D	B	F_w	E_w	r (Min)	r_1 (Min)	C_r	C_{or}	Grease	Oil	NU type	NJ type	NUP type	N type	NF type	D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	
120	260	55	154.0	—	3.0	3.0	632	727	2000	2600	NU324E	NJ324E	NUP324E	—	—	133	—	151	156	171	247	—	—	2.5	2.5	13.9
	260	86	154.0	226.0	3.0	3.0	710	920	2000	2600	NU2324	NJ2324	NUP2324	N2324	—	133	133	151	156	171	247	247	230	2.5	2.5	21.5
	260	86	154.0	—	3.0	3.0	785	1020	2000	2600	NU2324E	NJ2324E	NUP2324E	—	—	133	—	151	156	171	247	—	—	2.5	2.5	26.1
	310	72	170.0	260.0	5.0	5.0	675	770	2000	2400	NU424	NJ424	NUP424	N424	NF424	140	140	168	172	190	290	290	262	4	4	28.9
130	200	32	148.0	182.0	2.0	1.1	246	378	3200	3800	NU1026	NJ1026	NUP1026	N1026	—	136.5	139	146	151	156	191	194	184	2	1	3.69
	230	40	156.0	204.0	3.0	3.0	258	320	2600	3200	NU226	NJ226	NUP226	N226	NF226	143	143	151	158	168	217	217	208	2.5	2.5	6.32
	230	40	153.5	—	3.0	3.0	371	466	2400	2800	NU226E	NJ226E	NUP226E	—	—	143	—	151	158	168	217	—	—	2.5	2.5	6.92
	230	64	156.0	204.0	3.0	3.0	380	530	2400	3000	NU2226	NJ2226	NUP2226	N2226	—	143	143	151	158	168	217	217	208	2.5	2.5	10.2
	230	64	153.5	—	3.0	3.0	550	776	2400	3000	NU2226E	NJ2226E	NUP2226E	—	—	143	—	151	158	168	217	—	—	2.5	2.5	11.8
	280	58	167.0	243.0	4.0	4.0	500	570	2200	2600	NU326	NJ326	NUP326	N326	NF326	146	146	164	169	184	264	264	247	3	3	17.4
	280	58	167.0	—	4.0	4.0	590	694	1900	2400	NU326E	NJ326E	NUP326E	—	—	146	—	164	169	184	264	—	—	3	3	19.4
	280	93	167.0	243.0	4.0	4.0	840	1130	1900	2400	NU2326	NJ2326	NUP2326	N2326	—	146	146	164	169	184	264	264	247	3	3	26.9
	280	93	167.0	—	4.0	4.0	860	1126	1900	2400	NU2326E	NJ2326E	NUP2326E	—	—	146	—	164	169	184	264	—	—	3	3	30.9
	340	78	185.0	285.0	5.0	5.0	825	955	1800	2200	NU426	NJ426	NUP426	N426	NF426	150	150	183	187	208	320	320	287	4	4	37.7
140	210	33	158.0	192.0	2.0	1.1	251	396	3000	3600	NU1028	NJ1028	NUP1028	N1028	—	146.5	149	156	161	166	201	204	194	2	1	4.05
	250	42	169.0	221.0	3.0	3.0	297	375	2400	3000	NU228	NJ228	NUP228	N228	NF228	153	153	166	171	182	237	237	225	2.5	2.5	7.88
	250	42	169.0	—	3.0	3.0	395	515	2200	2600	NU228E	NJ228E	NUP228E	—	—	153	—	166	171	182	237	—	—	2.5	2.5	8.73
	250	68	169.0	221.0	3.0	3.0	445	635	2200	2800	NU2228	NJ2228	NUP2228	N2228	—	153	153	166	171	182	237	237	225	2.5	2.5	12.9
	250	68	169.0	—	3.0	3.0	575	835	2200	2600	NU2228E	NJ2228E	NUP2228E	—	—	153	—	166	171	182	237	—	—	2.5	2.5	15.8
	300	62	180.0	260.0	4.0	4.0	550	640	2000	2400	NU328	NJ328	NUP328	N328	NF328	156	156	176	182	198	284	284	265	3	3	21.2
	300	62	180.0	—	4.0	4.0	670	800	1700	2200	NU328E	NJ328E	NUP328E	—	—	156	—	176	182	198	284	—	—	3	3	23.2
	300	102	180.0	260.0	4.0	4.0	920	1250	1700	2200	NU2328	NJ2328	NUP2328	N2328	—	156	156	176	182	198	284	284	265	3	3	33.8
	300	102	180.0	—	4.0	4.0	1030.7	1405.4	1700	2200	NU2328E	NJ2328E	NUP2328E	—	—	156	—	176	182	198	284	—	—	3	3	38.7
	360	82	198.0	302.0	5.0	5.0	875	1020	1700	2000	NU428	NJ428	NUP428	N428	NF428	160	160	195	200	222	340	340	304	4	4	44.3
150	225	35	169.5	205.5	2.1	1.5	265	418	2800	3400	NU1030	NJ1030	NUP1030	N1030	—	158	161	167	173	178	214	217	208	2	1.5	4.77
	270	45	182.0	238.0	3.0	3.0	345	435	2200	2800	NU230	NJ230	NUP230	N230	NF230	163	163	179	184	196	257	257	242	2.5	2.5	9.92
	270	45	182.0	—	3.0	3.0	455	607	2000	2400	NU230E	NJ230E	NUP230E	—	—	163	—	179	184	196	257	—	—	2.5	2.5	11.1
	270	73	182.0	238.0	3.0	3.0	500	710	2000	2600	NU2230	NJ2230	NUP2230	N2230	—	163	163	179	184	196	257	257	242	2.5	2.5	16.3



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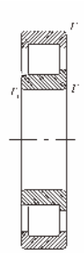

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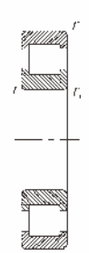

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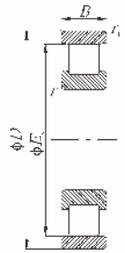

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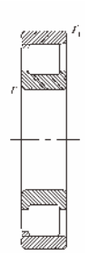

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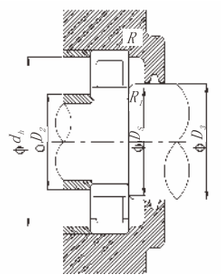
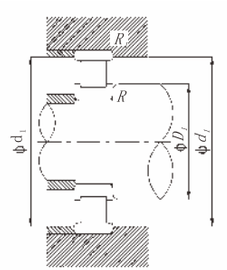
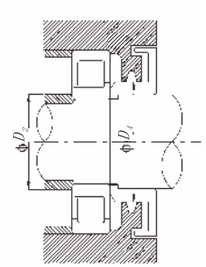
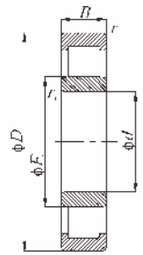






d 150~180 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers			Mounting dimensions (mm)										Reference mass (kg)
d	D	B	F_w	E_w	r (Min)	r_1 (Min)	C_r	C_{or}	Grease	Oil	NU type	NJ type	NUP type	N type	NF type	D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	
150	270	73	182.0	—	3.0	3.0	630	920	2000	2400	NU2230E	NJ2230E	NUP2230E	—	—	163	—	179	184	196	257	—	—	2.5	2.5	19.7
	320	65	193.0	277.0	4.0	4.0	590	690	1800	2200	NU330	NJ330	NUP330	N330	NF330	166	166	190	195	213	304	304	282	3	3	25.3
	320	65	193.0	—	4.0	4.0	758	922	1600	2000	NU330E	NJ330E	NUP330E	—	—	166	—	190	195	213	304	—	—	3	3	28.4
	320	108	193.0	277.0	4.0	4.0	1020	1400	1600	2000	NU2330	NJ2330	NUP2330	N2330	—	166	166	190	195	213	304	304	282	3	3	40.6
	320	108	193.0	—	4.0	4.0	1190	1650	1600	2000	NU2330E	NJ2330E	NUP2330E	—	—	166	—	190	195	213	304	—	—	3	3	47.2
	380	85	213.0	317.0	5.0	5.0	930	1120	1600	2000	NU430	NJ430	NUP430	N430	NF430	170	170	210	216	237	360	360	319	4	4	50.8
160	240	38	180.0	220.0	2.1	1.5	238	340	2600	3200	NU1032	NJ1032	NUP1032	N1032	—	168	171	178	184	189	229	232	222	2	1.5	5.91
	290	48	195.0	255.0	3.0	3.0	430	570	2200	2600	NU232	NJ232	NUP232	N232	NF232	173	173	192	197	210	277	277	259	2.5	2.5	13.7
	290	48	195.0	—	3.0	3.0	513	691	1900	2200	NU232E	NJ232E	NUP232E	—	—	173	—	192	197	210	277	—	—	2.5	2.5	15.6
	290	80	195.0	255.0	3.0	3.0	630	940	1900	2400	NU2232	NJ2232	NUP2232	N2232	—	173	173	192	197	210	277	277	259	2.5	2.5	22.1
	290	80	193.0	—	3.0	3.0	816	1204	1900	2400	NU2232E	NJ2232E	NUP2232E	—	—	173	—	192	197	210	277	—	—	2.5	2.5	25.1
	340	68	208.0	292.0	4.0	4.0	700	875	1700	2000	NU332	NJ332	NUP332	N332	NF332	176	176	200	211	228	324	324	297	3	3	31.3
	340	68	204.0	—	4.0	4.0	874	1080	1500	1900	NU332E	NJ332E	NUP332E	—	—	176	—	200	211	228	324	—	—	3	3	34
	340	114	208.0	292.0	4.0	4.0	1070	1520	1500	1900	NU2332	NJ2332	NUP2332	N2332	—	176	176	200	211	228	324	324	297	3	3	50.5
	340	114	204.0	—	4.0	4.0	1348	1835	1500	1900	NU2332E	NJ2332E	NUP2332E	—	—	176	—	200	211	228	324	—	—	3	3	56
170	260	42	193.0	237.0	2.1	2.1	287	415	2400	2800	NU1034	NJ1034	NUP1034	N1034	—	181	181	190	197	203	249	249	239	2	2	7.88
	310	52	208.0	272.0	4.0	4.0	475	635	2000	2400	NU234	NJ234	NUP234	N234	NF234	186	186	204	211	223	294	294	277	3	3	17
	310	52	207.0	—	4.0	4.0	617	796	1800	2200	NU234E	NJ234E	NUP234E	—	—	186	—	204	211	223	294	—	—	3	3	19.6
	310	86	208.0	272.0	4.0	4.0	715	1080	1800	2200	NU2234	NJ2234	NUP2234	N2234	—	186	186	204	211	223	294	294	277	3	3	27.2
	310	86	205.0	—	4.0	4.0	965	1410	1800	2200	NU2234E	NJ2234E	NUP2234E	—	—	186	—	204	211	223	294	—	—	3	3	31
	360	72	220.0	310.0	4.0	4.0	795	1010	1600	2000	NU334	NJ334	NUP334	N334	NF334	186	186	216	223	241	344	344	315	3	3	37
	360	120	220.0	310.0	4.0	4.0	1420	2000	1400	1800	NU2334	NJ2334	NUP2334	N2334	—	186	186	216	223	241	344	344	315	3	3	59.5
180	280	46	205.0	255.0	2.1	2.1	399	597	2200	2600	NU1036	NJ1036	NUP1036	N1036	—	191	191	203	209	216	269	269	257	2	2	10.3
	320	52	218.0	282.0	4.0	4.0	495	675	1900	2200	NU236	NJ236	NUP236	N236	NF236	196	196	214	221	233	304	304	287	3	3	17.7
	320	52	217.0	—	4.0	4.0	595.6	797.2	1700	2000	NU236E	NJ236E	NUP236E	—	—	196	—	214	221	233	304	—	—	3	3	20.4
	320	86	218.0	282.0	4.0	4.0	745	1140	1700	2000	NU2236	NJ2236	NUP2236	N2236	—	196	196	214	221	233	304	304	287	3	3	28.4
	320	86	215.0	—	4.0	4.0	927	1408	1700	2000	NU2236E	NJ2236E	NUP2236E	—	—	196	—	214	221	233	304	—	—	3	3	31.9
	380	75	232.0	328.0	4.0	4.0	966	1260	1500	1800	NU336	NJ336	NUP336	N336	NF336	196	196	227	235	255	364	364	333	3	3	44.2
	380	126	232.0	328.0	4.0	4.0	1420	2090	1300	1700	NU2336	NJ2336	NUP2336	N2336	—	196	196	227	235	255	364	364	333	3	3	69.5



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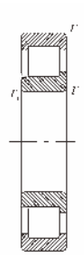

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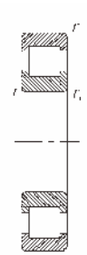

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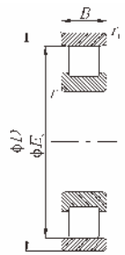

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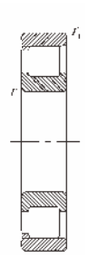

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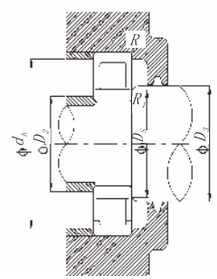
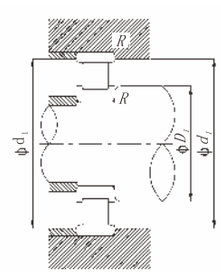
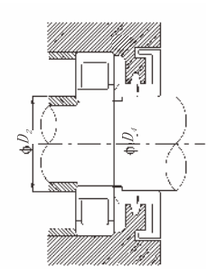
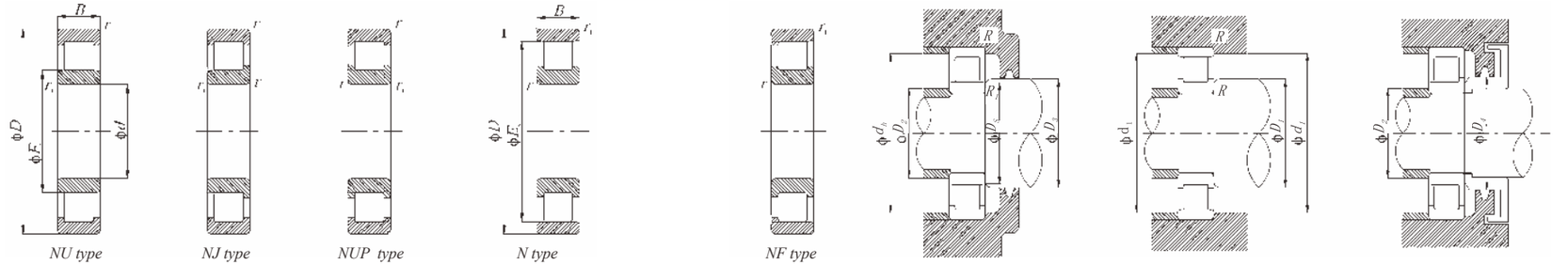






d 190~200mm

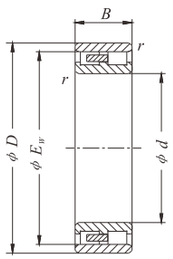
d	Boundary dimensions (mm) D	B	F_w	E_w	r (Min)	r_1 (Min)	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Grease	Oil	Nominal numbers NU type	NJ type	Nominal numbers NUP type	N type	NF type	Mounting dimensions (mm) D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	Reference mass (kg)
190	290	46	215.0	265.0	2.1	2.1	365	535	2000	2600	**NU1038**	**NJ1038**	**NUP1038**	**N1038**	—	201	201	213	219	226	279	279	267	2	2	10.7
	340	55	231.0	299.0	4.0	4.0	555	770	1800	2200	**NU238**	**NJ238**	**NUP238**	**N238**	**NF238**	206	206	227	234	247	324	324	304	3	3	21.3
	340	55	230.0	—	4.0	4.0	695	955	1600	1900	**NU238E**	**NJ238E**	**NUP238E**	—	—	206	—	227	234	247	324	—	—	3	3	24.2
	340	92	231.0	299.0	4.0	4.0	830	1290	1600	2000	**NU2238**	**NJ2238**	**NUP2238**	**N2238**	—	206	206	227	234	247	324	324	304	3	3	34.4
	340	92	228.0	—	4.0	4.0	1090	1650	1600	1900	**NU2238E**	**NJ2238E**	**NUP2238E**	—	—	206	—	227	234	247	324	—	—	3	3	39.5
	400	78	245.0	345.0	5.0	5.0	1130	1430	1400	1700	**NU338**	**NJ338**	**NUP338**	**N338**	**NF338**	210	210	240	248	268	380	380	351	4	4	49.4
	400	132	245.0	345.0	5.0	5.0	1520	2220	1300	1600	**NU2338**	**NJ2338**	**NUP2338**	**N2338**	—	210	210	240	248	268	380	380	351	4	4	80.5
200	310	51	229.0	281.0	2.1	2.1	390	580	2000	2400	**NU1040**	**NJ1040**	**NUP1040**	**N1040**	—	211	211	226	233	241	299	299	283	2	2	13.9
	360	58	244.0	316.0	4.0	4.0	620	865	1700	2000	**NU240**	**NJ240**	**NUP240**	**N240**	**NF240**	216	216	240	247	261	344	344	321	3	3	25.3
	360	58	243.0	—	4.0	4.0	765	1060	1500	1800	**NU240E**	**NJ240E**	**NUP240E**	—	—	216	—	240	247	261	344	—	—	3	3	28.1
	360	98	244.0	316.0	4.0	4.0	925	1440	1500	1800	**NU2240**	**NJ2240**	**NUP2240**	**N2240**	—	216	216	240	247	261	344	344	321	3	3	41.3
	360	98	241.0	—	4.0	4.0	1220	1870	1500	1800	**NU2240E**	**NJ2240E**	**NUP2240E**	—	—	216	—	240	247	261	344	—	—	3	3	47.8
	420	80	260.0	360.0	5.0	5.0	975	1270	1300	1600	**NU340**	**NJ340**	**NUP340**	**N340**	**NF340**	220	220	254	263	283	400	400	366	4	4	55.8
	420	138	260.0	360.0	5.0	5.0	1510	2240	1200	1500	**NU2340**	**NJ2340**	**NUP2340**	**N2340**	—	220	220	254	263	283	400	400	366	4	4	92.6



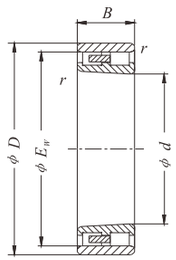
NU type　NJ type　NUP type　N type　NF type

d **220~800mm**

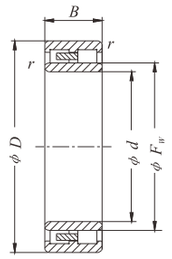
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers			Mounting dimensions (mm)										Reference mass (kg)
d	D	B	F_w	E_w	r (Min)	r_1 (Min)	C_r	C_{or}	Grease	Oil	NU type	NJ type	NUP type	N type	NF type	D_s Min	D_1 Min	D_2 Max	D_3 Min	D_4 Min	d_h Max	d_1 Max	d_1 Min	R Max	R_1 Max	
220	340	56	250	310	3	3	500	750	1800	2200	NU1044	NJ1044	NUP1044	N1044	—	233	233	247	254	283	327	327	313	2.5	2.5	18.2
	400	65	270	350	4	4	760	1080	1500	1800	NU244	NJ244	NUP244	N244	NF244	236	236	264	273	289	384	384	357	3	3	37.3
	400	108	270	350	4	4	1140	1810	1300	1600	NU2244	NJ2244	NUP2244	—	—	236	236	264	273	289	384	384	357	3	3	61.8
	460	88	284	396	5	5	1190	1570	1200	1500	NU344	NJ344	NUP344	N344	—	240	240	278	287	307	440	440	403	4	4	74.6
240	360	56	270	330	3	3	530	820	1600	2000	NU1048	NJ1048	NUP1048	N1048	—	253	253	266	275	—	347	347	333	2.5	2.5	19.5
	440	72	295	385	4	4	935	1340	1300	1600	NU248	NJ248	NUP248	N248	NF248	256	256	289	298	316	424	424	292	3	3	50.5
	440	120	295	385	4	4	1440	2320	1200	1500	NU2248	NJ2248	NUP2248	—	—		256	289	298	316	424	—	—	3	3	84.9
	500	95	310	430	5	5	1360	1820	1100	1300	NU348	NJ348	NUP348	N348	—	260	260	304	313	333	480	480	438	4	4	94.6
260	400	65	296	364	4	4	645	1000	1500	1800	NU1052	NJ1052	NUP1052	N1052	—	276	276	292	300	—	384	384	367	3	3	29.1
	480	80	320	420	5	5	1100	1580	1200	1500	NU252	NJ252	NUP252	N252	NF252	280	280	314	323	343	460	460	428	4	4	67.1
	480	130	320	420	5	5	1710	2770	1100	1300	NU2252	NJ2252	NUP2252	N2252	—		280	314	323	343	460	—	—	4	4	111
	540	102	336	464	6	6	1540	2090	1000	1200	NU352	NJ352	NUP352	—	—	286	286	330	339	359	514	514	472	5	5	118
280	420	65	316	384	4	4	660	1050	1400	1700	NU1056	NJ1056	NUP1056	N1056	—	296	296	312	320	—	404	404	387	3	3	30.8
	500	80	340	440	5	5	1140	1680	1100	1400	NU256	NJ256	NUP256	N256	NF256	300	300	334	344	364	480	480	448	4	4	70.7
300	460	74	340	420	4	4	885	1400	1300	1500	NU1060	NJ1060	NUP1060	—	—	316	316	336	344	—	444	444	424	3	3	43.7
	540	85	364	476	5	5	1400	2070	1100	1300	NU260	NJ260	NUP260	N260	—	320	320	358	368	391	520	520	484	4	4	89.2
320	480	74	360	440	4	4	905	1470	1200	1400	NU1064	NJ1064	NUP1064	—	—	336	336	356	365	—	464	464	444	3	3	46.1
	580	92	390	510	5	5	1540	2270	950	1200	NU264	NJ264	NUP264	N264	NF264	340	340	384	394	420	560	560	519	4	4	112
340	520	82	385	475	5	5	1080	1740	1100	1300	NU1068	NJ1068	NUP1068	N1068	—	360	360	381	390	—	500	500	479	4	4	61.8
360	540	82	405	495	5	5	1110	1830	1000	1300	NU1072	NJ1072	NUP1072	N1072	—	380	380	400	410	—	520	520	499	4	4	64.6
380	560	82	425	—	5	5	1140	1910	1000	1200	NU1076	—	—	—	—	—	400	420	430	—	540	—	—	4	4	67.5
400	600	90	450	—	5	5	1360	2280	900	1100	NU1080	—	—	—	—	—	420	445	455	—	580	—	—	4	4	88.2
420	620	90	450	—	5	5	1390	2380	850	1100	NU1084	—	—	—	—	—	440	465	475	—	600	—	—	4	4	91.7
440	650	94	493	—	6	6	1470	2530	800	1000	NU1088	—	—	—	—	—	466	488	498	—	624	—	—	5	5	105
460	680	100	516	—	6	6	1580	2740	750	950	NU1092	—	—	—	—	—	486	511	521	—	654	—	—	5	5	123
480	700	100	536	—	6	6	1620	2860	750	900	NU1096	—	—	—	—	—	506	531	541	—	674	—	—	5	5	130
500	720	100	556	—	6	6	1660	2970	710	850	NU10/500	—	—	—	—	—	526	551	558	—	694	—	—	5	5	131
530	780	112	—	—	6	6	2290	4050	—	800	NU10/530	—	—	—	—	—	—	—	—	—	—	—	—	5	5	190
560	820	115	—	—	6	6	2330	4250	—	750	NU10/560	—	—	—	—	—	—	—	—	—	—	—	—	5	5	210
600	870	118	—	—	6	6	2750	5100	—	700	NU10/600	—	—	—	—	—	—	—	—	—	—	—	—	5	5	245
630	920	128	—	—	7.5	7.5	3410	6200	—	630	NU10/630	—	—	—	—	—	—	—	—	—	—	—	—	6	6	285
670	980	136	—	—	7.5	7.5	3740	6800	—	600	NU10/670	—	—	—	—	—	—	—	—	—	—	—	—	6	6	350
710	1030	140	—	—	7.5	7.5	4680	8500	—	560	NU10/710	—	—	—	—	—	—	—	—	—	—	—	—	6	6	415
750	1090	150	—	—	7.5	7.5	4730	8800	—	430	NU10/750	—	—	—	—	—	—	—	—	—	—	—	—	6	6	490
800	1150	155	—	—	7.5	7.5	5500	10600	—	400	NU10/800	—	—	—	—	—	—	—	—	—	—	—	—	6	6	560



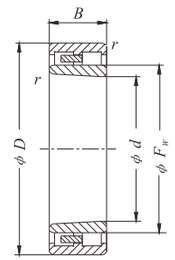
NN
Cylindrical bore



NN
Tapered bore



NNU
Cylindrical bore



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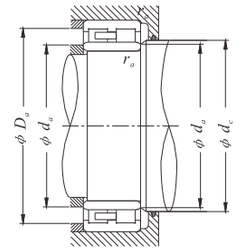
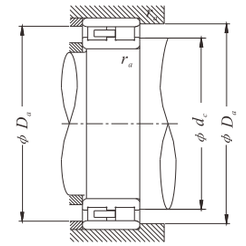
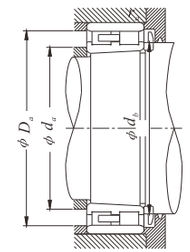
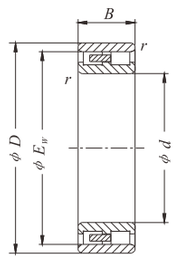




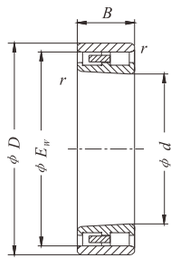


d 25~105 mm

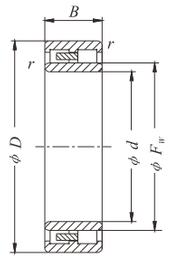
Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions (mm)							Reference mass(kg)	
d	D	B	F_w	E_w	r (Min)	C_r	C_{or}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a Min	d_a Max	d_b Min	d_c Min	D_a Max	D_a Min	r_a Max	Cylindrical bore	Tapered bore
25	47	16	—	41.3	0.6	25.8	30.0	14,000	17,000	NN3005	NN3005K	3282105	3182105	29	—	29	—	43	42	0.6	0.125	0.122
30	55	19	—	48.5	1.0	31.0	37.0	12,000	14,000	NN3006	NN3006K	3282106	3182106	35	—	36	—	50	50	1	0.199	0.193
35	62	20	—	55.0	1.0	39.5	50.0	10,000	12,000	NN3007	NN3007K	3282107	3182107	40	—	41	—	57	56	1	0.243	0.236
40	68	21	—	61.0	1.0	48.7	64.6	9,000	11,000	NN3008	NN3008K	3282108	3182108	45	—	46	—	63	62	1	0.311	0.302
45	75	23	—	67.5	1.0	57.6	78.9	8,500	10,000	NN3009	NN3009K	3282109	3182109	50	—	51	—	70	69	1	0.405	0.393
50	80	23	—	72.5	1.0	65.4	90.6	7,500	9,000	NN3010	NN3010K	3282110	3182110	55	—	56	—	75	74	1	0.436	0.419
55	90	26	—	81.0	1.1	75.7	108.0	6,700	8,000	NN3011	NN3011K	3282111	3182111	61.5	—	62	—	83.5	83	1	0.648	0.63
60	95	26	—	86.1	1.1	77.4	114.0	6,300	7,500	NN3012	NN3012K	3282112	3182112	66.5	—	67	—	88.5	88	1	0.694	0.681
65	100	26	—	91.0	1.1	81.5	124.0	6,000	7,100	NN3013	NN3013K	3282113	3182113	71.5	—	72	—	93.5	93	1	0.74	0.731
70	110	30	—	100.0	1.1	98.8	151.0	5,600	6,700	NN3014	NN3014K	3282114	3182114	76.5	—	77	—	103.5	102	1	1.07	1.01
75	115	30	—	105.0	1.1	96.5	149.0	5,300	6,300	NN3015	NN3015K	3282115	3182115	81.5	—	82	—	108.5	107	1	1.14	1.11
80	125	34	—	113.0	1.1	123.0	194.0	4,800	6,000	NN3016	NN3016K	3282116	3182116	86.5	—	87	—	118.5	115	1	1.53	1.48
85	130	34	—	118.0	1.1	126.0	203.0	4,500	5,600	NN3017	NN3017K	3282117	3182117	91.5	—	92	—	123.5	120	1	1.63	1.55
90	140	37	—	127.0	1.5	143.0	228.0	4,300	5,000	NN3018	NN3018K	3282118	3182118	98	—	99	—	132	129	1.5	2.12	2.01
95	145	37	—	132.0	1.5	154.0	255.0	4,000	5,000	NN3019	NN3019K	3282119	3182119	103	—	104	—	137	134	1.5	2.21	2.09
100	140	40	113.0	—	1.1	155.0	295.0	4,000	5,000	NNU4920	NNU4920K	4482920	4382920	106.5	111	108	115	133.5	—	1	1.83	1.75
	140	40	—	129.0	1.1	155.0	295.0	4,000	5,000	NN4920	NN4920K	4282920	4182920	106.5	—	108	—	133.5	131	1	1.75	1.67
	150	37	—	137.0	1.5	161.0	274.0	4,000	4,800	NN3020	NN3020K	3282120	3182120	108	—	109	—	142	139	1.5	2.26	2.19
105	145	40	118.0	—	1.1	161.0	315.0	3,800	4,800	NNU4921	NNU4921K	4482921	4382921	111.5	116	113	120	138.5	—	1	1.91	1.82
	145	40	—	134.0	1.1	161.0	315.0	3,800	4,800	NN4921	NN4921K	4282921	4182921	111.5	—	113	—	138.5	136	1	1.82	1.73
	160	41	—	146.0	2.0	201.0	328.0	3,800	4,500	NN3021	NN3021K	3282121	3182121	114	—	115	—	151	148	2	2.88	2.79



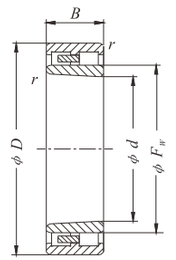
NN
Cylindrical bore



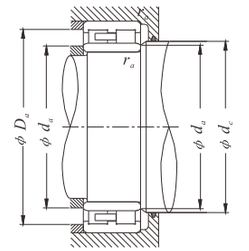
NN
Tapered bore

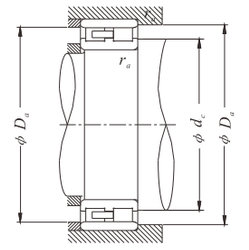


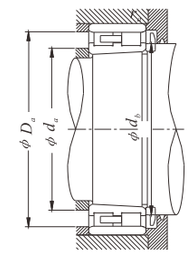
NNU
Cylindrical bore



NNU
Tapered bore

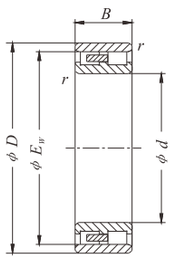




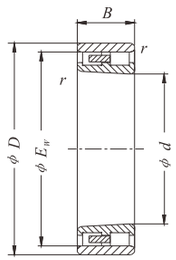


d 110~200 mm

Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions (mm)							Reference mass(kg)	
d	D	B	F_w	E_w	r (Min)	C_r	C_{0r}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a Min	d_a Max	d_b Min	d_c Min	D_a Max	D_a Min	r_a Max	Cylindrical bore	Tapered bore
110	150	40	122.0	—	1.1	167.0	335.0	3,600	4,500	NNU4922	NNU4922K	4482922	4382922	116.5	121	118	125	143.5	—	1	1.99	1.9
	150	40	—	139.0	1.1	167.0	335.0	3,600	4,500	NN4922	NN4922K	4282922	4182922	116.5	—	118	—	143.5	141	1	1.9	1.81
	170	45	—	155.0	2.0	231.0	380.0	3,400	4,300	NN3022	NN3022K	3282122	3182122	119	—	121	—	161	157	2	3.69	3.56
120	165	45	133.5	—	1.1	183.0	360.0	3,200	4,000	NNU4924	NNU4924K	4482924	4382924	126.5	133	128	137	158.5	—	1	2.75	2.63
	165	45	—	154.5	1.1	183.0	360.0	3,200	4,000	NN4924	NN4924K	4282924	4182924	127	—	128	—	158.5	157	1	2.63	2.51
	180	46	—	165.0	2.0	229.0	241.0	3,200	3,800	NN3024	NN3024K	3282124	3182124	129	—	131	—	171	167	2	4.04	3.92
130	180	50	146.0	—	1.5	238.0	487.0	3,000	3,800	NNU4926	NNU4926K	4482926	4382926	138	143	140	148	172	—	1.5	3.85	3.65
	180	50	—	168.0	1.5	238.0	487.0	3,000	3,800	NN4926	NN4926K	4282926	4182926	138	—	140	—	172	170	1.5	3.65	3.46
	200	52	—	182.0	2.0	265.0	457.0	3,000	3,600	NN3026	NN3026K	3282126	3182126	139	—	141	—	191	185	2	5.88	5.71
140	190	50	154.0	—	1.5	183.0	585.0	2,800	3,600	NNU4928	NNU4928K	4482928	4382928	148	153	150	158	182	—	1.5	4.1	3.9
	190	50	—	178.0	1.5	283.0	585.0	2,800	3,600	NN4928	NN4928K	4282928	4182928	148	—	150	—	182	180	1.5	4.1	3.9
	210	53	—	192.0	2.0	270.0	477.0	2,800	3,400	NN3028	NN3028K	3282128	3182128	149	—	151	—	201	195	2	6.44	6.21
150	210	60	167.0	—	2.0	350.0	715.0	2,600	3,200	NNU4930	NNU4930K	4482930	4382930	159	166	162	171	201	—	2	6.18	5.9
	210	60	—	196.5	2.0	350.0	715.0	2,600	3,200	NN4930	NN4930K	4282930	4182930	159	—	162	—	201	199	2	5.9	5.62
	225	56	—	206.0	2.1	335.0	585.0	2,600	3,000	NN3030	NN3030K	3282130	3182130	161	—	162	—	214	209	2	7.81	7.53
160	220	60	177.0	—	2.0	365.0	760.0	2,400	3,000	NNU4932	NNU4932K	4482932	4382932	169	176	172	182	211	—	2	6.53	6.23
	220	60	—	206.5	2.0	365.0	760.0	2,400	3,000	NN4932	NN4932K	4282932	4182932	169	—	172	—	211	209	2	6.24	5.94
	240	60	—	219.0	2.1	375.0	660.0	2,400	2,800	NN3032	NN3032K	3282132	3182132	171	—	172	—	229	222	2	8.92	8.59
170	230	60	187.0	—	2.0	375.0	805.0	2,400	2,800	NNU4934	NNU4934K	4482934	4382934	179	186	182	192	221	—	2	6.87	6.55
	230	60	—	216.5	2.0	375.0	805.0	2,400	2,800	NN4934	NN4934K	4282934	4182934	179	—	182	—	221	219	2	6.56	6.24
	260	67	—	236.0	2.1	450.0	805.0	2,200	2,600	NN3034	NN3034K	3282134	3182134	181	—	183	—	249	239	2	12.6	12.2
180	250	69	200.0	—	2.0	480.0	1020.0	2,200	2,600	NNU4936	NNU4936K	4482936	4382936	189	199	193	205	241	—	2	9.9	9.46
	250	69	—	234.0	2.0	480.0	1020.0	2,200	2,600	NN4936	NN4936K	4282936	4182936	189	—	193	—	241	236	2	9.45	9.01
	280	74	—	255.0	2.1	565.0	995.0	2,000	2,400	NN3036	NN3036K	3282136	3182136	191	—	193	—	269	258	2	16.6	16
190	260	69	212.0	—	2.0	464.0	997.0	2,000	2,600	NNU4938	NNU4938K	4482938	4382938	199	209	205	215	251	—	2	10.3	9.93
	260	69	—	244.0	2.0	464.0	997.0	2,000	2,600	NN4938	NN4938K	4282938	4182938	199	—	205	—	251	246	2	9.92	9.47
	290	75	—	265.0	2.1	595.0	1080.0	2,000	2,400	NN3038	NN3038K	3282138	3182138	201	—	207	—	279	267	2	18	17.4
200	280	80	223.0	—	2.1	570.0	1220.0	1,900	2,400	NNU4940	NNU4940K	4482940	4382940	211	222	218	228	269	—	2	14.7	14
	280	80	—	261.0	2.1	575.0	1220.0	1,900	2,400	NN4940	NN4940K	4282940	4182940	211	—	218	—	269	264	2	14	13.3
	310	82	—	282.0	2.1	707.0	1260.0	1,800	2,200	NN3040	NN3040K	3282140	3182140	211	—	218	—	299	285	2	21.7	20.8



NN
Cylindrical bore



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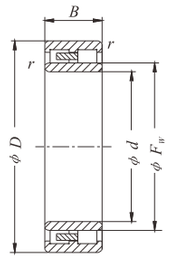
Tapered bore



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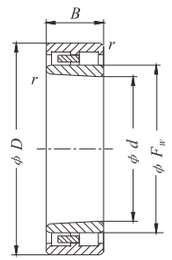
Cylindrical bore



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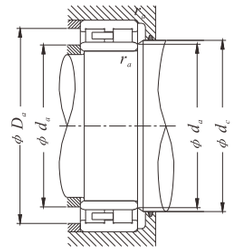
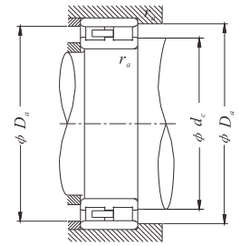
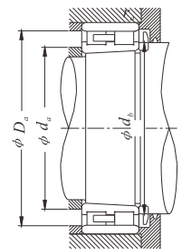


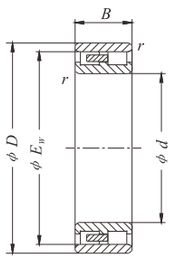




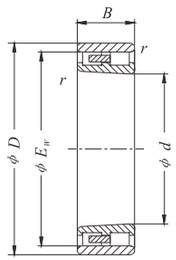
d 220~300 mm

Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions (mm)							Reference mass(kg)	
d	D	B	F_w	E_w	r (Min)	C_r	C_{0r}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a Min	d_a Max	d_b Min	d_c Min	D_a Max	D_a Min	r_a Max	Cylindrical bore	Tapered bore
220	300	80	243.0	—	2.1	600.0	1330.0	1,700	2,200	NNU4944	NNU4944K	4482944	4382944	231	242	238	248	289	—	2	15.9	15.2
	300	80	—	281.0	2.1	600.0	1330.0	1,700	2,200	NN4944	NN4944K	4282944	4182944	231	—	238	—	289	284	2	15.2	14.4
	340	90	—	310.0	3.0	815.0	1480.0	1,700	2,000	NN3044	NN3044K	3282144	3182144	233	—	240	—	327	313	2.5	29.3	28.2
240	320	80	265.0	—	2.1	637.0	1480.0	1,600	2,000	NNU4948	NNU4948K	4482948	4382948	251	262	258	269	309	—	2	17.3	16.5
	320	80	—	301.0	2.1	512.0	1140.0	1,600	2,000	NN4948	NN4948K	4282948	4182948	251	—	258	—	309	304	2	16.4	15.6
	360	92	—	330.0	3.0	855.0	1660.0	1,500	1,800	NN3048	NN3048K	3282148	3182148	253	—	261	—	347	333	2.5	32.9	31.7
260	360	100	284.0	—	2.1	991.0	2070.0	1,400	1,800	NNU4952	NNU4952K	4482952	4382952	271	288	279	296	349	—	2	29.7	28.4
	360	100	—	336.0	2.1	748.0	1700.0	1,400	1,800	NN4952	NN4952K	4282952	4182952	271	—	279	—	349	339	2	28.3	27
	400	104	—	364.0	4.0	1030.0	1920.0	1,400	1,700	NN3052	NN3052K	3282152	3182152	276	—	285	—	384	367	3	47.4	45.8
280	380	100	309.0	—	2.1	960.0	2230.0	1,300	1,700	NNU4956	NNU4956K	4482956	4382956	291	308	299	316	369	—	2	31.6	30.2
	380	100	—	356.0	2.1	960.0	2230.0	1,300	1,700	NN4956	NN4956K	4282956	4182956	291	—	299	—	369	359	2	30.2	28.8
	420	106	—	384.0	4.0	1109.0	2150.0	1,300	1,500	NN3056	NN3056K	3282156	3182156	296	—	305	—	404	387	3	51.1	49.3
300	420	118	336.0	—	3.0	1230.0	2870.0	1,200	1,500	NNU4960	NNU4960K	4482960	4382960	313	335	323	343	407	—	2.5	48.5	46.3
	420	118	—	391.0	3.0	1626.0	3924.0	1,200	1,500	NN4960	NN4960K	4282960	4182960	313	—	323	—	407	394	2.5	46.3	44.1
	460	118	—	418.0	4.0	1290.0	2460.0	1,200	1,400	NN3060	NN3060K	3282160	3182160	316	—	326	—	444	421	3	70.8	68.6

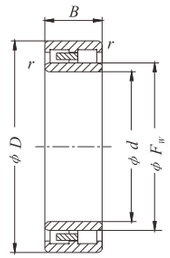
d **320~1000mm**



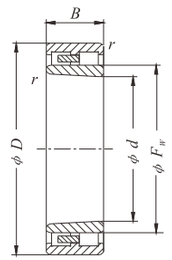
NN
Cylindrical bore



NN
Tapered bore



NNU
Cylindrical bore



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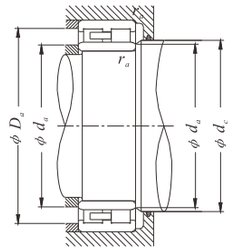
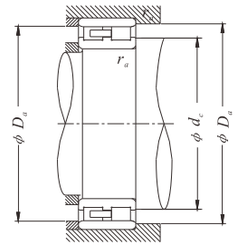
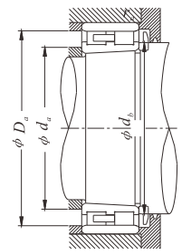
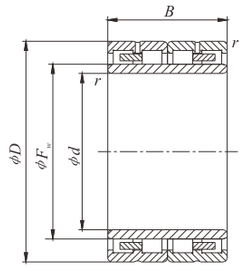
Tapered bore



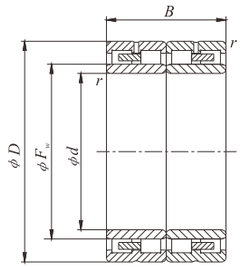




Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions (mm)							Reference mass(kg)	
d	D	B	F_w	E_w	r (Min)	C_r	C_{0r}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a Min	d_a Max	d_b Min	d_c Min	D_a Max	D_a Min	r_a Max	Cylindrical bore	Tapered bore
320	440	118	356.0	—	3.0	1260.0	3050.0	1,100	1,400	**NNU4964**	**NNU4964K**	—	—	333	355	338	363	427	—	2.5	54.9	—
	480	121	—	438.0	4.0	1350.0	2670.0	1,100	1,300	**NN3064**	**NN3064K**	—	—	336	—	340	—	464	442	3	76.6	—
340	520	133	—	473.0	5.0	1670.0	3300.0	1,000	1,200	**NN3068**	**NN3068K**	—	—	360	—	365	—	500	477	4	102	—
360	540	134	—	493.0	5.0	1700.0	3450.0	950	1,200	**NN3072**	**NN3072K**	—	—	380	—	385	—	520	497	4	106	—
380	560	180	—	—	5.0	2860.0	6000.0	—	1,000	**NNU4076M**	**NNU4076KM**	—	—	—	—	—	—	—	—	4	150	—
400	600	200	—	—	5.0	3470.0	7200.0	—	950	**NNU4080F**	**NNU4080KF**	—	—	—	—	—	—	—	—	4	205	—
420	620	200	—	—	5.0	3520.0	7500.0	—	900	**NNU4084M**	**NNU4084KM**	—	—	—	—	—	—	—	—	4	183	—
440	650	212	—	—	6.0	3910.0	8300.0	—	850	**NNU4088M**	**NNU4088KM**	—	—	—	—	—	—	—	—	5	215	—
460	680	218	—	—	6.0	4290.0	9300.0	—	800	**NNU4092M**	**NNU4092KM**	—	—	—	—	—	—	—	—	5	240	—
480	700	218	—	—	6.0	4400.0	9650.0	—	750	**NNU4096M**	**NNU4096KM**	—	—	—	—	—	—	—	—	5	275	—
500	720	218	—	—	6.0	4460.0	10000.0	—	750	**NNU40/500M**	**NNU40/500KM**	—	—	—	—	—	—	—	—	5	287	—
530	780	250	—	—	6.0	5500.0	12200.0	—	670	**NNU40/530M**	**NNU40/530KM**	—	—	—	—	—	—	—	—	5	420	—
560	820	258	—	—	6.0	5720.0	12900.0	—	630	**NNU40/560M**	**NNU40/560KM**	—	—	—	—	—	—	—	—	5	475	—
600	870	272	—	—	6.0	6820.0	15600.0	—	600	**NNU40/600M**	**NNU40/600KM**	—	—	—	—	—	—	—	—	5	530	—
630	920	290	—	—	7.5	7650.0	17600.0	—	560	**NNU40/630M**	**NNU40/630KM**	—	—	—	—	—	—	—	—	6	635	—
670	980	308	—	—	7.5	8420.0	19600.0	—	500	**NNU40/670M**	**NNU40/670KM**	—	—	—	—	—	—	—	—	6	765	—
710	1030	315	—	—	7.5	9350.0	21600.0	—	480	**NNU40/710M**	**NNU40/710KM**	—	—	—	—	—	—	—	—	6	850	—
750	1090	335	—	—	7.5	10200.0	24000.0	—	430	**NNU40/750M**	**NNU40/750KM**	—	—	—	—	—	—	—	—	6	925	—
800	1150	345	—	—	7.5	10800.0	26000.0	—	400	**NNU40/800M**	**NNU40/800KM**	—	—	—	—	—	—	—	—	6	1140	—
850	1220	365	—	—	7.5	11700.0	28500.0	—	360	**NNU40/850M**	**NNU40/850KM**	—	—	—	—	—	—	—	—	6	1340	—
900	1280	375	—	—	7.5	12800.0	31500.0	—	340	**NNU40/900M**	**NNU40/900KM**	—	—	—	—	—	—	—	—	6	1500	—
950	1360	412	—	—	7.5	14200.0	35500.0	—	320	**NNU40/950M**	**NNU40/950KM**	—	—	—	—	—	—	—	—	6	1900	—
1000	1420	412	—	—	7.5	15400.0	38000.0	—	300	**NNU40/1000M**	**NNU40/1000KM**	—	—	—	—	—	—	—	—	6	2000	—



FC type

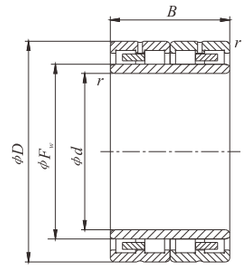


FCD type

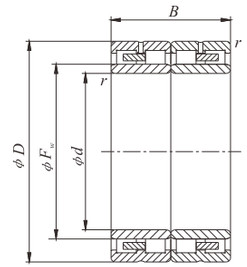
d 90~140 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Reference mass (kg)
d	D	B	F_w	r (Min)	C_r	C_{0r}	Grease	Oil		
90	140	70	105	1.5	222	454	3600	4400	**FC182870**	4.4
	140	70	105	1.5	222	454	3600	4400	**FC182870YZ**	4.4
	140	74	105	1.5	222	454	3600	4400	**FC182874**	4.5
100	138	80	110	1.5	262	609	3400	4200	**FC202880**	3.7
	140	70	111	1.5	194	416	3400	4200	**FC202870**	3.5
	140	104	111	1.5	293	707	3400	4200	**FC2028104**	5.1
	140	104	111	1.5	293	707	3400	4200	**FC2028104YZ**	5.1
	145	70	113	1.5	219	457	3300	4100	**FC202970**	4.1
	150	106	113	1.5	347	736	3200	4000	**FC2030106**	6.8
	150	106	113	1.5	347	736	3200	4000	**FC2030106YZ**	6.8
110	150	80	122	1.5	241	602	3100	3800	**FC223080**	4.4
	170	90	127	2	358	754	2800	3400	**FC223490**	7.9
	170	120	127	2	358	755	2800	3400	**FC2234120**	10.6
	170	120	127	2	358	755	2800	3400	**FC2234120YZ**	10.6
120	180	92	137	2	375	820	2500	3100	**FC243692**	8.7
	180	105	136	2	429	927	2500	3100	**FC2436105**	9.8
	180	105	136	2	429	927	2500	3100	**FC2436105YZ**	9.8
	180	120	136	2	477	1061	2500	3100	**FC/2436120**	11.2
130	200	104	150	2	478	1006	2200	2700	**FC2640104**	12.5
	200	125	149	2	531	1148	2200	2700	**FC2640125**	15
	200	125	149	2	531	1148	2200	2700	**FC2640125YZ**	15
140	190	119	154	2	—	—	—	—	**FC2838119**	—
	210	100	158	2	503	1096	2000	2500	**FC2842100**	12.8
	210	106	158	2	503	1096	2000	2500	**FC2842106**	13.6
	210	125	158	2	617	1365	2000	2500	**FC2842125**	15.8
	210	125	158	2	617	1365	2000	2500	**FC2842125YZ**	15.8
	210	155	158	2	756	1774	2000	2500	**FC2842155**	19.6
	210	155	158	2	756	1774	2000	2500	**FC2842155YZ**	19.6

Remarks:Numbers with suffix code YZ are four-row cylindrical roller bearings whose radial clearances are selected by using basic shaft system.



FC type

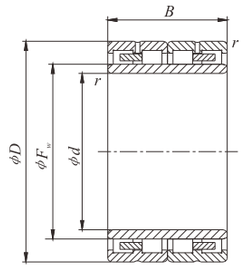


FCD type

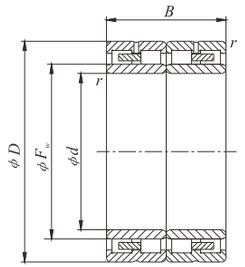
d 145~170 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Reference mass (kg)
d	D	B	F_w	r (Min)	C_r	C_{0r}	Grease	Oil		
145	210	155	166	2	720	1560	—	—	**FC2942155**	—
	210	155	166	2	720	1560	—	—	**FC2942155YZ**	—
	225	156	169	2	795	1935	1900	2400	**FC2945156**	24.4
	225	156	169	2	795	1935	1900	2400	**FC2945156YZ**	24.4
150	225	120	169	2	640	1400	1900	2300	**FC3045120**	18
	225	120	169	2	640	1400	1900	2300	**FC3045120YZ**	18
	230	156	174	2	797	1818	1860	2300	**FC3046156**	24.6
	230	156	174	2	797	1818	1860	2300	**FC3046156YZ**	24.6
160	225	168	183	2.1	1947	2301	—	—	**FC3245168**	—
	230	130	180	2.1	605	1384	1800	2200	**FC3246130**	18
	230	130	180	2.1	639	1610	1800	2200	**FC3246130YZ**	18.7
	230	168	180	2.1	618	2218	1800	2200	**FC3246168**	24.2
	240	124	183	2.1	690	1534	1700	2100	**FC3248124**	20.6
	240	124	183	2.1	780	1800	1700	2100	**FC3248124YZ**	20.6
	240	124	183	2.1	690	1534	1700	2100	**FC3248124/P6**	20.6
	240	168	183	2.1	947	2310	1700	2100	**FC3248168**	28
	240	168	183	2.1	822	2070	1700	2100	**FC3248168YZ**	28.5
	260	168	183	2.1	953	2326	1700	2100	**FC3252168/C4**	28.5
170	230	130	188.5	2.1	680	1720	1720	2150	**FC3446130/P4**	16.3
	230	180	186	2.1	707	2041	1700	2100	**FC/3446180/P64**	22.7
	240	130	190	2.1	830	1830	1600	1900	**FC/3448130/P6**	—
	250	170	192	2.1	1000	2400	1600	1970	**FC/3450170/P64**	29.9
	250	170	192	2.1	953	2325	1600	1970	**FC3450170**	29.9
	250	170	192	2.1	953	2325	1600	1970	**FC3450170YZ**	29.9
	260	120	195	2.1	880	1775	1550	1900	**FC3452120**	24.2
	260	120	195	2.1	880	1775	1550	1900	**FC3452120YZ**	24.2
	260	150	195	2.1	860	1948	1500	1900	**FC3452150**	30.2
	260	170	196	2.1	1080	2460	1550	1900	**FC3452170/P64**	34.9
	260	225	196	2.1	1270	3350	—	—	**FC/3452225/P64**	—

Remarks:Numbers with suffix code YZ are four-row cylindrical roller bearings whose radial clearances are selected by using basic shaft system.



FC type

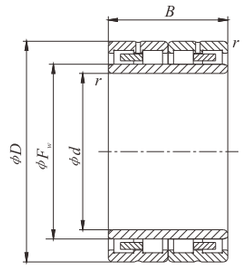


FCD type

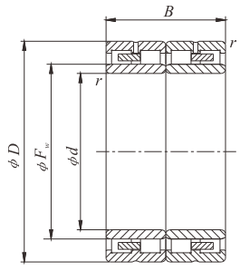
d 180~200 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Reference mass (kg)
d	D	B	F_w	r (Min)	C_r	C_{0r}	Grease	Oil		
180	250	120	200	2.1	609	1583	1540	1900	FC3650120/P64	19
	250	130	200	2.1	715	1944	1540	1900	FC3650130/P64	20.6
	250	156	200	2.1	710	1927	1540	1900	FC/3650156/P64	24.7
	250	156	200	2.1	710	1927	1540	1900	FC/3650156	24.7
	260	120	202	2.1	693	1860	—	—	FC3652120	
	260	124	202	2.1	718	1668	1500	1800	FC/3652124/P64	22.6
	260	154	202	2.1	983	2200	1500	1850	FC3652154/P64	28.2
	260	160	202	2.1	893	2206	1500	1800	FC3652160/C4	29.2
	260	168	202	2.1	993	2530	1500	1800	FC3652168	30.7
	260	168	202	2.1	993	2530	1500	1800	FC3652168YZ	30.7
	260	168	202	2.1	993	2530	1500	1800	FC3652168/P64	30.7
	260	180	202	2.1	1100	2560	1500	1850	FC3652180	32.9
	280	180	207	2.1	1220	2580	1400	1700	FC3656180	43.4
	280	180	207	2.1	1220	2580	1400	1700	FC3656180/P64	43.4
190	260	168	212	2.1	990	2600	—	—	FC3852168/P6	—
	260	168	212	2.1	990	2600	1400	1800	FC3852168/C4	27.9
	265	124	213	2.1	816	1926	1400	1750	FC3853124	22.1
	270	124	212	2.1	816	1925	1400	1700	FC3854124	24.2
	270	168	212	2.1	996	2486	1400	1700	FC3854168	32.7
	270	168	212	2.1	996	2486	1400	1700	FC3854168YZ	32
	270	200	212	2.1	954	2431	1400	1700	FC3854200	38
	270	200	212	2.1	954	2431	1400	1700	FC3854200YZ	38
	280	200	214	2.1	954	2431	—	—	FC3856200/P64	—
200	270	120	222	2.1	615	1626	1340	1650	FC/4054120/C4	20.8
	270	170	222	2.1	831	2387	1340	1650	FC/4054170/C4	29.5
	280	200	222	2.1	1019	2693	1300	1600	FC4056200	39.9
	280	200	222	2.1	1019	2693	1300	1600	FC4056200/P64	39.9
	280	200	224	2.1	1150	2770	1300	1600	FC4056200A	39.9
	290	130	226	2.1	840	1975	1250	1540	FC4058130/P6	29.9

Remarks:Numbers with suffix code YZ are four-row cylindrical roller bearings whose radial clearances are selected by using basic shaft system.



FC type

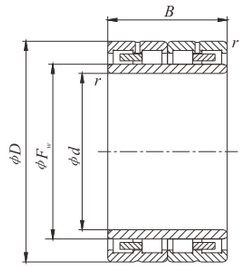


FCD type

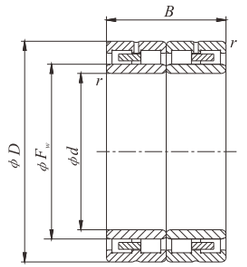
d 200~250 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Reference mass (kg)
d	D	B	F_w	r (Min)	C_r	C_{0r}	Grease	Oil		
200	290	192	226	2.1	1073	2891	1250	1540	FC4058192/P64	44.9
	290	192	226	2.1	1205	3141	1250	1540	FC4058192	44.1
210	290	192	234	2.1	1031	3000	1200	1500	FC/4258192	40.6
	290	192	236	2.1	1300	3400	1200	1500	FC/4258192/P6	40.4
	300	170	234	2.1	1031	2814	1160	1400	FC4260170	41.4
	300	210	234	2.1	1300	3040	1150	1450	FC4260210	50.3
220	300	192	242	2.1	1085	3310	1120	1380	FC/4460192	41.5
	310	157	246	2.1	932	2500	1100	1300	FC/4462157	39.7
	310	190	246	2.1	1283	3503	1100	1300	FC/4462190/C4	47.2
	310	192	246	2.1	1103	3104	1100	1300	FC4462192	48.6
	310	192	246	2.1	1103	3104	1100	1300	FC4462192/P64	48.6
	320	210	248	2.1	1321	3534	1050	1300	FC4464210/P6	59.8
	340	192	246	2.1	1599	3444	980	1200	FC/4468192	65.6
230	330	170	260	2.1	1142	2974	980	1200	FC/4666170	50.2
	330	206	260	2.1	1278	3435	980	1200	FC4666206	60.8
	330	206	260	2.1	1278	3435	980	1200	FC4666206/P64	60.8
	365	250	266	2.1	2400	4900	—	—	FC/4673250/P6	—
240	330	220	264	2.1	1373	3789	950	1200	FC4866220/P64	58.4
	330	220	264	2.1	1373	3789	950	1200	FC4866220	58.4
	340	192	268	2.1	1394	4014	920	1100	FC/4868192YZ	58
	340	192	266	2.1	1219	4014	920	1100	FC/4868192/P64	58
	360	220	272	2.1	1604	4065	—	—	FC4872220	83
	360	220	272	2.1	1604	4065	—	—	FC4872220/P64	83
250	340	170	274	3	1140	3281	890	1100	FC/5068170	47.9
	350	220	278	3	1350	3804	—	—	FC5070220	69.6
	350	220	278	3	1350	3804	—	—	FC5070220/P64	72.7
	360	160	284	3	1077	2780	1120	1380	FC5072160/C4	57
	360	220	282	3	1486	4210	1120	1380	FC/5072220	78.5

Remarks:Numbers with suffix code YZ are four-row cylindrical roller bearings whose radial clearances are selected by using basic shaft system.



FC type

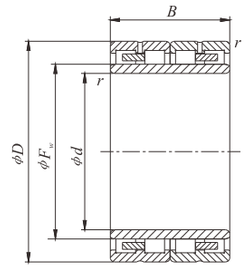


FCD type

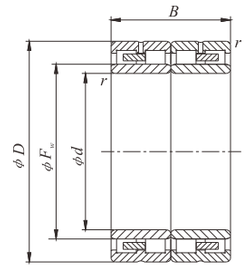
d 260~300 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Reference mass (kg)
d	D	B	F_w	r (Min)	C_r	C_{0r}	Grease	Oil		
260	360	192	288	3	1274	3468	1100	1350	**FC5272192**	62.3
	360	200	288	3	1483	4217	1100	1350	**FC/5272200/C4**	64.9
	370	200	292	3	1610	4400	1080	1330	**FC5274200**	74.2
	370	200	292	3	1610	4400	1080	1330	**FC5274200YZ**	74.2
	370	220	292	3	1760	4920	1080	1300	**FC5274220**	73.7
	370	220	292	3	1760	4920	1080	1300	**FC5274220/P6**	73.7
	380	220	292	3	1516	4353	1060	1300	**FC/5276220**	91.2
	380	280	295	3	1966	5710	1060	1300	**FC5276280**	114.5
	380	280	295	3	1966	5710	1060	1300	**FC5276280YZ**	114.5
	400	200	296	3	1795	4051	1020	1250	**FC5280200**	95.6
	400	290	296	3	2710	7100	—	—	**FCD5280290**	—
270	380	230	298	3	1725	4598	1040	1280	**FC5476230**	85.3
	380	230	298	3	1725	4598	1040	1280	**FC5476230YZ**	85.3
	400	220	305	3	1833	4570	1000	1230	**FC/5480220**	100
280	375	200	307	3	1480	4311	1030	1270	**FC/5675200**	65.1
	380	290	308	3	1888	5835	1020	1250	**FC/5676290**	100
	380	220	312	3	1575	4640	1000	1230	**FC/5676220**	86.2
	390	220	312	3	1600	4730	1000	1230	**FC5678220**	86.2
	390	220	312	3	1800	5350	1000	1230	**FC5678220YZ**	85.1
	390	240	312	3	1763	5325	1000	1200	**FC/5678240**	93.4
	390	275	308	3	2250	6500	1000	1230	**FCD/5678275**	105.1
	420	280	318	3	2430	6350	950	1170	**FCD/5684280**	143.4
290	410	240	320	4	2070	5670	950	1170	**FC5882240**	105
	410	240	320	4	2070	5670	950	1170	**FC5882240YZ**	103.6
300	420	240	332	4	2060	5695	915	1130	**FC6084240**	107.8
	420	240	332	4	2225	5750	915	1130	**FCD6084240**	107.8
	420	300	332	4	2305	6565	915	1130	**FCD6084300**	134.7
	420	300	332	4	2305	6565	915	1130	**FCD6084300YZ**	134.7

Remarks:Numbers with suffix code YZ are four-row cylindrical roller bearings whose radial clearances are selected by using basic shaft system.



FC type

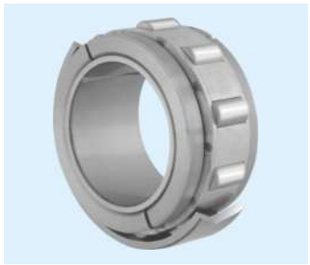


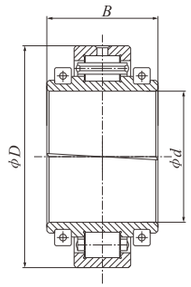
FCD type

d 320~370 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Reference mass (kg)
d	D	B	F_w	r (Min)	C_r	C_{0r}	Grease	Oil		
320	440	240	351	4	2120	6101	850	1050	**FC/6488240**	113.9
	440	240	351	4	2120	6101	850	1050	**FCD/6488240**	113.9
	440	300	352	3	2530	7660	850	1050	**FCD/3488300**	142.3
	450	240	355	3	2145	5860	840	1030	**FC6490240**	142.3
	450	240	355	3	2145	5860	840	1030	**FC6490240YZ**	125.3
	450	240	355	3	2145	5860	840	1030	**FCD/6490240**	125.3
	460	280	357	4	2450	6534	825	1020	**FC/6492280**	159
	460	340	357	4	2895	8105	825	1020	**FCD/6492340**	193.1
	480	290	364	4	2450	6534	825	1020	**FC6496290**	170
330	460	340	365	4	2790	8265	810	1000	**FCD6692340YZ**	182.1
	460	340	365	4	2790	8265	810	1000	**FCD6692340**	182.1
340	450	250	366	4	2161	6312	810	1000	**FC6890250**	111.2
	450	250	369	4	2045	6134	810	1000	**FCD/6890250**	112.6
	450	250	371	4	1976	6142	810	1000	**FC6890250YA**	114.1
	460	260	370	4	2132	5977	800	980	**FC6892260**	128.2
	480	350	378	4	3270	9480	770	950	**FC6896350**	207
350	500	380	389	5	3800	11400	—	—	**FCD70100380**	—
	520	300	401	5	3300	9000	—	—	**FCD70104300**	—
360	510	370	392	4	3756	5686	715	886	**FCD72102370**	273
370	520	380	409	4	4160	12312	700	850	**FCD74104380YZ**	260.5
	520	380	409	4	3645	1075	700	850	**FCD74104380**	263.2

Remarks:Numbers with suffix code YZ are four-row cylindrical roller bearings whose radial clearances are selected by using basic shaft system.



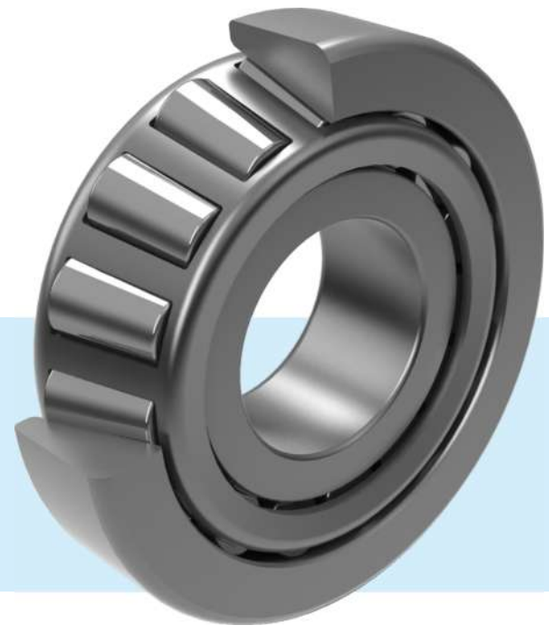


d 90~1000mm

Boundary dimensions (mm)			Nominal numbers	Reference mass (kg)
d	D	B		
90	152.4	76.4	**MS90A**	4.38
	152.4	64.3	**MS90B**	4.13
110	203	93.4	**MS110A**	10.59
	203	78	**MS110B**	9.45
130	222	82.5	**MS130A**	9.03
	222	98.4	**MS130B**	9.59
140	241.5	108	**MS140A**	14.5
	214.5	108	**MS140B**	14.2
155	254	98.5	**MS155A**	16.84
	254	90.5	**MS155B**	16.14
	254	107.3	**MS155C**	18.65
	254	91	**MS155D**	16.05
220	393.7	156	**316350DA**	90
240	440	156	**319307A**	125
300	558.8	220	**319307C**	105
318	622.37	272	**BCSB 322213CA**	515
320	622.37	272	**316351CA**	470
355.6	488.95	146	**BC1B 319605**	72.5
400	600	220	**BCS-8000**	200
414	740	320	**316352CA**	700
420	740	320	**BC1B 319576DA**	680
500	850.9	360	**316353DA**	985
580	750	160	**BC1M 580-319470**	135
630	794	190	**BCSB 316283A**	160
900	1090	150	**BCSB 316586**	240
1000	1220	170	**BCSB 320099**	345

Remarks: If you know more parameters and performance, please contact R&D center of C&U.

Tapered roller bearing



Tapered roller bearing

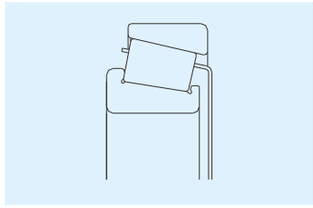
Tapered roller bearing

Tapered roller bearings are mainly suitable for bearing radial and axial combined loads dominated by radial load. Tapered roller bearings with large taper angle can be used to bear radial and axial combined loads dominated by axial loads. As a separable bearing, its inner ring assembly (including tapered rollers and cage) and outer ring can be installed separately. During installations and applications, the radial and axial clearance of the bearing can be adjusted, and pre-interference installation is also possible.

1. Main structure type

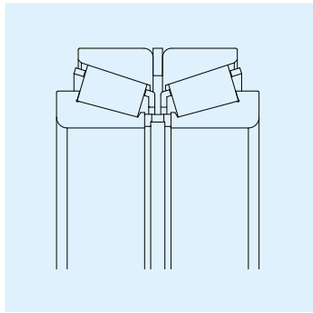
1.1 Single-row tapered roller bearing type

Single-row tapered roller bearings can limit the axial displacement of shaft and housing in one direction, and take axial load from single direction. Single-row tapered roller bearings are generally used in pairs to support the shaft, because it generates additional axial forces when subjected to radial load. 31300 series tapered roller bearings have large contact angles (27° ~30°) and can bear large axial loads. The contact angles of other series bearings are between 10°~18°.



1.2 Double-row tapered roller bearing 350000 type

Double-row tapered roller bearings have a double raceway outer ring and two inner rings, and a spacer between the two inner rings. The radial clearance of the bearing can be adjusted by changing the thickness of the spacer. This kind of bearing can bear bidirectional axial load while carrying radial load, and can limit the bidirectional axial displacement of shaft or housing within the axial clearance range of the bearing. C&U can also provide double row tapered roller bearings with double half outer ring structure.



2. Allowable misalignment angle

The proper contact state of roller and rings can not only prevent abnormal edge loads on the contact surface, but also allow the misalignment of inner and outer rings caused by installation errors. The allowable misalignment angle of tapered roller bearings are generally 0.0005rad (1.7') for back-to-back arrangement, and 0.001rad (3.4') for face-to-face arrangement. Please contact C&U Group if larger misalignment angles are required.

3. Tolerance and clearance

Tapered roller bearings with different kinds of tolerance class can be manufactured as required. Clearance of single-row tapered roller bearings can be adjusted at the time of installation if necessary. The radial clearance of double row tapered roller bearings can be changed by the aforementioned tolerances and clearances according to the customer requirements.

4. Dynamic equivalent radial load

Single row tapered roller bearing:

$P_r=F_r$ $(F_a/F_r \leqslant e)$

$P_r=0.4F_r+YF_a$ $(F_a/F_r>e)$

When single-row tapered roller bearings (basic dimensions can be different) are used in pairs, the additional axial force caused by radial load must be taken into account when calculating the dynamic equivalent load of the bearing. The axial load magnitude of the bearing is related to its arrangement method and the direction of the applied axial load.

The additional axial force “S” of single-row tapered roller bearings can be approximately calculated according to the following formula:

$S=F_r/2Y$

Double row tapered roller bearing:

$P_r=F_r+Y_1F_a$ $(F_a/F_r \leqslant e)$

$P_r=0.67F_r+Y_2F_a$ $(F_a/F_r>e)$

5. Static equivalent radial load

Single row tapered roller bearing

$P_{0r}=0.5F_r+Y0F_a$, if $P_{0r}<F_r$, adopt $P_{0r}=F_r$

Double row tapered roller bearing

$P_{0r}=F_r+Y_0F_a$

F_r and F_a both refer to the total load applied to single row and double row bearings.

See the bearing specification table for calculating coefficients e, Y, Y_1, Y_2 and Y_0.

6. Minimum radial load

In order to prevent the sliding between the roller and raceway caused by the inertial force of roller and cage during the high-speed rotations, the bearing must carry a certain load. Its minimum value can be estimated according to the following formula:

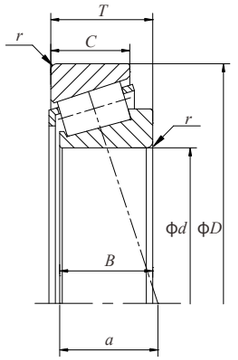
$F_{rmin}=0.02C_r$

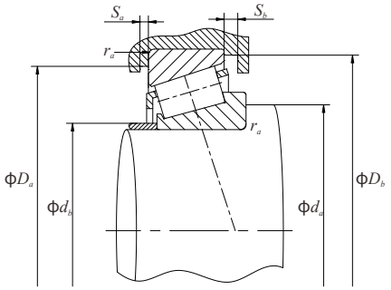
In the equations:

F_{rmin}:minimum radial load kN

C_r :basic dynamic load rating kN

Metric series

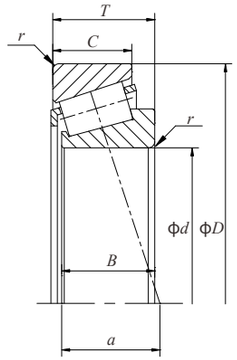


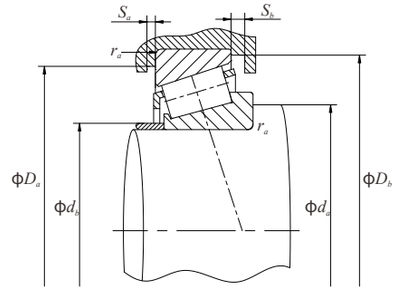


d 15~30 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Mounting dimensions (mm)								Application point position mm	Constant	Axial load coefficient		Reference mass (kg)
					r(Min)								d_a	d_b	D_a	D_b	S_a	S_b	Inner ring r_a	Outer ring r_a					
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil			Min	Max	Max	Min	Min	Min	(Max)		a	e	Y_1	Y_0	
15	35	11.75	11	10	0.6	0.6	14.8	13.2	11,000	15,000	**30202**	**7202E**	23	19	30	33	2	1.5	0.6	0.6	8.2	0.32	1.9	1.0	0.056
	42	14.25	13	11	1	1	23.6	21.1	9,500	13,000	**30302**	**7302E**	24	22	36	38.5	2	3	1	1	9.5	0.29	2.1	1.2	0.096
17	40	13.25	12	11	1	1	21.7	21.9	9,500	13,000	**30203**	**7203E**	26	23	34	37.5	2	2	1	1	9.7	0.35	1.7	0.96	0.079
	40	17.25	16	14	1	1	22.7	23.3	9,500	13,000	**32203**	**7503E**	26	22	34	37.5	2	3	1	1	11.0	0.29	2.1	1.1	0.105
	47	15.25	14	12	1	1	29.2	26.7	8,500	12,000	**30303**	**7303E**	26	24	41	43	2	3	1	1	10.4	0.29	2.1	1.2	0.133
	47	20.25	19	16	1	1	36.6	35.9	8,500	11,000	**32303**	**7603E**	23	24	41	43	2	4	1	1	12.2	0.29	2.1	1.1	0.174
20	42	15	15	12	0.6	0.6	24.6	27.4	9,000	12,000	**32004**	**2007104E**	28	24	37	40	3	3	0.6	0.6	10.6	0.37	1.6	0.88	0.102
	47	15.25	14	12	1	1	27.9	28.5	8,000	11,000	**30204**	**7204E**	29	27	41	44	2	3	1	1	11.0	0.35	1.7	0.96	0.124
	47	19.25	18	15	1	1	31.5	33.5	8,000	10,000	**32204**	**7504E**	29	26	41	44	2	4	1	1	12.7	0.35	1.7	0.95	0.158
	52	16.25	15	13	1.5	1.5	35	33.5	7,500	10,000	**30304**	**7304E**	31	27	44	47.5	2	3	2.0	1.1	11.6	0.30	2	1.1	0.171
	52	22.25	21	18	1.5	1.5	45.5	47.5	8,000	11,000	**32304**	**7604E**	33	26	43	48	3	4	1.5	1.5	13.9	0.30	2	1.1	0.204
22	44	15	15	11.5	0.6	0.6	25.6	29.4	8,500	11,000	**320/22**	**20071/22E**	30	27	39	42	3	3.5	0.6	0.6	11.1	0.40	1.5	0.83	0.103
	50	15.25	14	12	1	1	29.2	30.5	7,500	10,000	**302/22**	—	31	29	44	47	2	3	1	1	11.6	0.37	1.6	0.9	0.139
	50	19.25	18	15	1	1	36.5	40.5	7,500	11,000	**322/22**	—	31	28	44	47	2	4	1	1	13.0	0.49	1.6	0.89	0.180
25	47	15	15	11.5	0.6	0.6	27.4	33	8,300	11,000	**32005**	**2007105E**	33	30	42	45	3	3.5	0.6	0.6	11.8	0.43	1.4	0.77	0.118
	47	17	17	14	0.6	0.6	31	38	8,000	11,000	**33005**	—	33	29	42	44	3	3	0.6	0.6	11.0	0.29	2.1	1.1	0.131
	52	16.25	15	13	1	1	32	35	7,000	9,000	**30205**	**7205E**	34	31	46	48.5	2	3	1	1	12.7	0.38	1.6	0.88	0.159
	52	19.25	18	15	1	1	38.5	43.5	7,000	10,000	**32205**	**7505E**	34	30	46	49	2	4	1	1	13.7	0.39	1.5	0.85	0.186
	52	22	22	18	1	1	47.5	56.5	7,900	10,000	**33205**	**3007205E**	34	29	46	49.5	4	4	1	1	14.1	0.35	1.7	0.94	0.225
	62	18.25	17	15	1.5	1.5	49.2	48.2	6,300	8,500	**30305**	**7305E**	36	34	54	57	2	3	1.5	1.5	13.2	0.30	2	1.1	0.271
	62	18.25	17	13	1.5	1.5	38	40	5,700	8,000	**31305**	**27305E**	34	32	47	59	3	5	1.5	1.5	19.1	0.81	0.74	0.41	0.260
	62	25.25	24	20	1.5	1.5	62.5	66	6,300	8,000	**32305**	**7605E**	38	32	53	59	3	5	1.5	1.5	15.6	0.30	2	1.1	0.365
28	52	16	16	12	1	1	32	39	7,100	9,500	**320/28**	—	37	33	46	50	3	4	1	1	12.8	0.43	1.4	0.77	0.146
	58	17.25	16	14	1	1	39.5	41.5	6,300	9,000	**302/28**	—	37	34	52	55	2	3	1	1	13.2	0.35	1.7	0.93	0.203
	68	19.75	18	15	1.5	1.5	55	55.5	6,000	8,000	**303/28**	—	39	37	59	61	2	4.5	1.5	1.5	14.5	0.31	1.9	1.1	0.341
30	55	17	17	13	1	1	36	44.5	6,700	9,000	**32006**	**2007106E**	39	35	49	53	3	4	1	1	13.5	0.43	1.4	0.77	0.170
	62	17.25	16	14	1	1	43	47.5	6,000	8,000	**30206**	**7206E**	39	37	56	58	2	3	1	1	13.9	0.38	1.6	0.88	0.245
	62	21.25	20	17	1	1	52	60	6,000	8,500	**32206**	**7506E**	39	36	56	58.5	2	4	1	1	15.4	0.38	1.6	0.88	0.285

Metric series

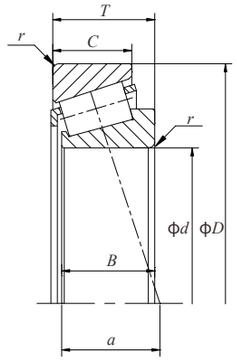


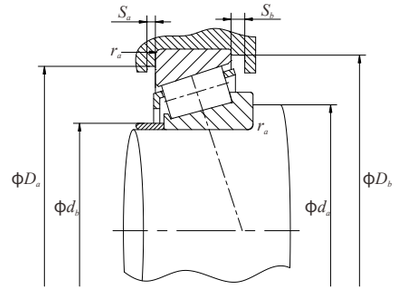


d 30~45 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Mounting dimensions (mm)								Application point position mm	Constant	Axial load coefficient		Reference mass (kg)
d	D	T	B	C	r(Min) Inner ring	r(Min) Outer ring	C_r	C_{0r}	Grease	Oil			d_a Min	d_b Max	D_a Max	D_b Min	S_a Min	S_b Min	r_a (Max) Inner ring	r_a (Max) Outer ring	a	e	Y_1	Y_0	
30	62	25	25	19.5	1	1	66.5	79.5	6,000	8,000	**33206**	—	39	35	56	59.5	5	5.5	1	1	16.1	0.34	1.8	0.97	0.355
	72	20.75	19	16	1.5	1.5	59.5	60	5,300	7,500	**30306**	7306E	41	40	63	66	3	4.5	1.5	1.5	15.1	0.32	1.9	1	0.408
	72	20.75	19	14	1.5	1.5	47.3	50	5,000	6,700	**31306**	27306E	40	37	55	68	3	6.5	1.5	1.5	22.3	0.81	0.74	0.41	0.378
	72	28.75	27	23	1.5	1.5	80	88.5	5,600	7,000	**32306**	7606E	43	36	63	68	3	5.5	1.5	1.5	18.0	0.32	1.6	0.88	0.575
32	58	17	17	13	1	1	37.5	47	6,300	8,500	**320/32**	—	41	37	52	55	3	4	1	1	14.2	0.45	1.3	0.73	0.191
	65	18.25	17	15	1	1	48.5	54	5,600	8,000	**302/32**	—	41	39	59	61	3	3	1	1	14.7	0.37	1.6	0.88	0.275
	65	22.25	21	18	1	1	56	65	6,000	8,000	**322/32**	—	41	38	59	61	3	4	1	1	15.9	0.37	1.6	0.88	0.336
	65	26	26	20.5	1	1	70	86.5	5,600	8,000	**332/32**	—	41	38	59	62	5	5.5	1	1	17.0	0.35	1.7	0.95	0.400
35	62	18	18	14	1	1	43.5	55.5	5,600	8,000	**32007**	2007107E	44	40	56	60	4	4	1	1	15.0	0.45	1.3	0.73	0.223
	62	21	21	17	1	1	49	65	5,600	8,000	**33007**	—	44	40	56	59	4	4	1	1	14.1	0.31	2	1.1	0.267
	72	18.25	17	15	1.5	1.5	54	59.5	5,300	7,100	**30207**	7207E	46	43	63	67	3	3	1.5	1.5	15.0	0.38	1.6	0.88	0.345
	72	24.25	23	19	1.5	1.5	70.5	83.5	5,300	7,100	**32207**	7507E	46	42	63	67.5	3	5	1.5	1.5	17.9	0.38	1.6	0.88	0.458
	72	28	28	22	1.5	1.5	86.5	108	5,300	7,100	**33207**	—	46	41	63	68	5	6	1.5	1.5	18.3	0.35	1.7	0.93	0.540
	80	22.75	21	18	2	1.5	76	79	4,800	6,700	**30307**	7307E	47	45	71	74	3	4.5	2	1.5	16.7	0.32	1.9	1	0.513
	80	22.75	21	15	2	1.5	62	68	4,300	6,000	**31307**	27307E	51	44	71	77	3	7.5	2	1.5	25.2	0.83	0.73	0.4	0.520
	80	32.75	31	25	2	1.5	99	111	5,000	6,700	**32307**	7607E	49	43	71	74	3	7.5	2	1.5	20.7	0.32	1.9	1	0.760
40	62	15	15	12	0.6	0.6	34	47	5,600	7,500	**32908**	2007908	48	44	57	59	3	3	0.6	0.6	11.5	0.29	2.1	1.1	0.163
	68	19	19	14.5	1	1	52.5	71	5,300	7,100	**32008**	2007108	49	45	62	65.5	4	4.5	1	1	15.0	0.38	1.6	0.87	0.280
	80	19.75	18	16	1.5	1.5	63.5	70	4,800	6,300	**30208**	7208E	51	48	71	75	3	3.5	1.5	1.5	16.6	0.38	1.6	0.88	0.438
	80	24.75	23	19	1.5	1.5	74	90.5	4,500	6,300	**32208**	7508E	51	47	71	76	3	5.5	1.5	1.5	18.9	0.38	1.6	0.88	0.559
	90	25.25	23	20	2	1.5	90.5	101	4,300	5,600	**30308**	7308E	52	52	81	82	3	5	2	1.5	19.5	0.35	1.7	0.96	0.761
	90	25.25	23	17	2	1.5	80	89.5	4,000	5,300	**31308**	27308E	56	50	81	87	3	8	2	1.5	20.8	0.36	1.7	0.9	0.726
	90	35.25	33	27	2	1.5	120	145	4,500	6,000	**32308**	7608E	54	50	81	82	3	8	2	1.5	23.4	0.35	1.7	0.96	1.045
45	68	15	15	12	0.6	0.6	34.5	50.5	5,000	6,700	**32909**	2007909	53	50	63	64	3	3	0.6	0.6	12.3	0.32	1.9	1	0.187
	75	20	20	15.5	1	1	60	83	4,500	6,300	**32009**	2007109	54	51	69	72	4	4.5	1	1	16.6	0.39	1.5	0.84	0.354
	85	20.75	19	16	1.5	1.5	68.5	79.5	4,300	6,000	**30209**	7209E	56	53	76	80	3	4.5	1.5	1.5	18.3	0.41	1.5	0.81	0.506
	85	24.75	23	19	1.5	1.5	83	102	4,300	6,000	**32209**	7509E	56	53	76	81	3	5.5	1.5	1.5	20.1	0.41	1.5	0.81	0.602

Metric series

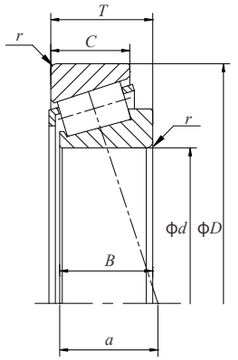


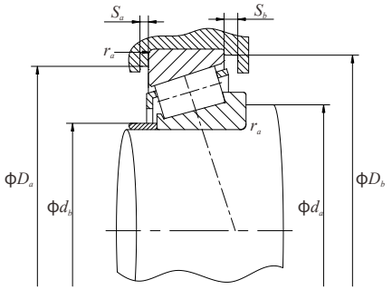


d 45~65 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Mounting dimensions (mm)								Application point position mm	Constant	Axial load coefficient		Reference mass (kg)
					r(Min)								d_a	d_b	D_a	D_b	S_a	S_b	Inner ring r_a	Outer ring r_a					
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil			Min	Max	Max	Min	Min	Min	(Max)		a	e	Y_1	Y_0	
45	100	27.25	25	22	2	1.5	112	127	3,800	5,300	**30309**	**7309E**	57	58	91	93	3	5	2	1.5	21.1	0.35	1.7	0.96	1.008
	100	27.25	25	18	2	1.5	95.5	109	4,000	5,000	**31309**	**27309E**	61	57	91	96	3	9	2	1.5	31.5	0.83	0.73	0.40	0.958
	100	38.25	36	30	2	1.5	144	177	3,800	5,300	**32309**	**7609E**	59	56	91	93	3	8	2	1.5	25.0	0.35	1.7	0.96	1.417
50	72	15	15	12	0.6	0.6	36	54	4,500	6,300	**32910**	**2007910**	58	54	67	69	3	3	0.6	0.6	13.5	0.34	1.8	0.97	0.192
	80	20	20	15.5	1	1	61	87	4,300	6,000	**32010**	**2007110**	59	56	74	77	4	4.5	1	1	17.9	0.42	1.4	0.78	0.310
	90	21.75	20	17	1.5	1.5	76	91.5	4,000	5,300	**30210**	**7210E**	61	58	81	85	3	4.5	1.5	1.5	19.6	0.42	1.4	0.79	0.592
	90	24.75	23	19	1.5	1.5	87.5	109	4,000	5,300	**32210**	**7510E**	61	57	81	86	3	5.5	1.5	1.5	21.0	0.42	1.4	0.79	0.618
	110	29.25	27	23	2.5	2	130	148	3,400	4,800	**30310**	**7310E**	65	65	100	102	3	6	2	2	23.1	0.35	1.7	0.96	1.250
	110	29.25	27	19	2.5	2	106	120	3,800	4,800	**31310**	**27310E**	62	60	100	104	4	10	2	2	34.2	0.83	0.73	0.40	1.254
	110	42.25	40	33	2.5	2	176	220	3,600	4,800	**32310**	**7610E**	68	62	100	102	3	9	2	2	27.9	0.35	1.7	0.96	1.885
55	90	23	23	17.5	1.5	1.5	81.5	117	3,800	5,300	**32011**	**2007111**	66	62	81	86	4	5.5	1.5	1.5	19.7	0.41	1.5	0.81	0.530
	100	22.75	21	18	2	1.5	94.5	113	3,600	5,000	**30211**	**7211E**	67	64	91	94	4	4.5	2	1.5	20.9	0.41	1.5	0.81	0.739
	100	26.75	25	21	2	1.5	110	137	3,600	5,000	**32211**	**7511E**	67	63	91	95	4	5.5	2	1.5	22.7	0.41	1.5	0.81	0.915
	120	31.5	29	25	2.5	2	150	171	3,200	4,300	**30311**	**7311E**	70	71	110	111	4	6.5	2	2	24.6	0.35	1.7	0.96	1.628
	120	31.5	29	21	2.5	2	121	137	3,400	4,300	**31311**	**27311E**	68	65	110	113	4	10.5	2	2	37.0	0.83	0.73	0.40	1.576
	120	45.5	43	35	2.5	2	204	258	3,200	4,300	**32311**	**7611E**	73	67	110	111	4	10.5	2	2	29.9	0.35	1.7	0.96	2.390
60	95	23	23	17.5	1.5	1.5	85.5	127	3,600	5,000	**32012**	**2007112**	71	66	86	91	4	5.5	1.5	1.5	20.9	0.43	1.4	0.77	0.560
	110	23.75	22	19	2	1.5	104	123	3,400	4,500	**30212**	**7212E**	72	69	101	103	4	4.5	2	1.5	22.0	0.41	1.5	0.81	0.934
	110	29.75	28	24	2	1.5	131	167	3,400	4,500	**32212**	**7512E**	72	68	101	104	4	5.5	2	1.5	24.1	0.41	1.5	0.81	1.197
	130	33.5	31	26	3	2.5	174	201	3,000	4,000	**30312**	**7312E**	78	77	118	120	4	7.5	2.5	2	26.0	0.35	1.7	0.96	1.940
	130	33.5	31	22	3	2.5	145	166	2,600	3,600	**31312**	**27312E**	84	74	118	125	4	11.5	2.5	2	40.3	0.83	0.73	0.40	1.896
	130	48.5	46	37	3	2.5	233	295	3,000	4,000	**32312**	**7612E**	81	74	118	120	4	11.5	2.5	2	31.4	0.35	1.7	0.96	2.880
65	100	23	23	17.5	1.5	1.5	86.5	132	3,400	4,500	**32013**	**2007113**	76	71	91	97	4	5.5	1.5	1.5	22.4	0.46	1.3	0.72	0.630
	120	24.75	23	20	2	1.5	122	151	3,000	4,000	**30213**	**7213E**	77	78	111	113	4	4.5	2	1.5	23.8	0.41	1.5	0.81	1.132
	120	32.75	31	27	2	1.5	157	202	3,000	4,000	**32213**	**7513E**	77	75	111	115	4	5.5	2	1.5	27.1	0.41	1.5	0.81	1.580
	140	36	33	28	3	2.5	200	233	2,600	3,600	**30313**	**7313E**	83	83	128	130	4	8	2.5	2	27.9	0.35	1.7	0.96	2.629
	140	36	33	23	3	2.5	173	205	2,800	3,600	**31313**	**27313E**	89	80	128	133	4	13	2.5	2	43.2	0.83	0.73	0.4	2.426
	140	51	48	39	3	2.5	267	340	2,800	3,800	**32313**	**7613E**	86	80	128	130	4	12	2.5	2	34.0	0.35	1.7	0.96	3.609

Metric series

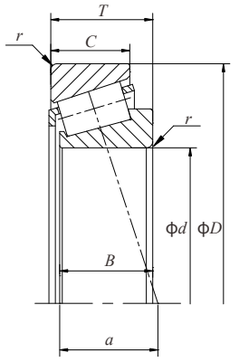


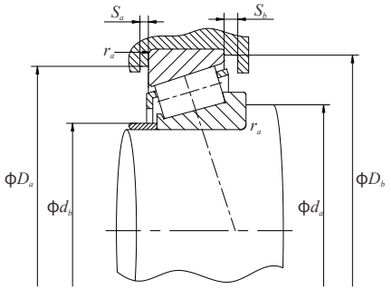


d 70~90 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Mounting dimensions (mm)								Application point position mm	Constant	Axial load coefficient		Reference mass (kg)
					r(Min)								d_a	d_b	D_a	D_b	S_a	S_b	Inner ring r_a	Outer ring r_a					
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil			Min	Max	Max	Min	Min	Min	(Max)		a	e	Y_1	Y_0	
70	110	25	25	19	1.5	1.5	104	158	3,200	4,300	**32014**	**2007114**	81	77	101	105	5	6	1.5	1.5	23.7	0.43	1.4	0.76	0.850
	125	26.25	24	21	2	1.5	132	163	2,800	4,000	**30214**	**7214E**	82	81	116	118	4	5	2	1.5	25.6	0.42	1.4	0.79	1.296
	125	33.25	31	27	2	1.5	157	205	2,800	4,000	**32214**	**7514E**	82	80	116	119	4	6	2	1.5	28.6	0.42	1.4	0.79	1.620
	150	38	35	30	3	2.5	227	268	2,400	3,400	**30314**	**7314E**	88	89	138	140	4	8	2.5	2	29.7	0.35	1.7	0.96	3.170
	150	38	35	25	3	2.5	192	229	2,600	3,400	**31314**	**27314E**	94	85	138	142	4	13	2.5	2	45.7	0.83	0.73	0.4	2.935
	150	54	51	42	3	2.5	300	390	2,600	3,400	**32314**	**7614E**	91	86	138	140	4	12	2.5	2	36.0	0.35	1.7	0.96	4.346
75	115	25	25	19	1.5	1.5	109	171	3,000	4,000	**32015**	**2007115**	86	82	106	110	5	6	1.5	1.5	25.1	0.46	1.3	0.72	0.880
	130	27.25	25	22	2	1.5	143	182	2,800	3,800	**30215**	**7215E**	87	85	121	124	4	5	2	1.5	27.0	0.44	1.4	0.76	1.384
	130	33.25	31	27	2	1.5	165	219	2,800	3,800	**32215**	**7515E**	87	84	121	125	4	6	2	1.5	29.8	0.44	1.4	0.76	1.765
	160	40	37	31	3	2.5	253	300	2,400	3,200	**30315**	**7315E**	93	95	148	149	4	9	2.5	2	31.8	0.35	1.7	0.96	3.542
	160	40	37	26	3	2.5	211	251	2,200	3,000	**31315**	**27315E**	99	91	148	152	6	14	2.5	2	48.7	0.83	0.73	0.4	3.469
	160	58	55	45	3	2.5	340	445	2,400	3,200	**32315**	**7615E**	96	91	148	149	4	13	2.5	2	38.9	0.35	1.7	0.96	5.316
80	125	29	29	22	1.5	1.5	140	222	2,800	3,600	**32016**	**2007116**	91	89	116	120	6	7	1.5	1.5	26.9	0.42	1.4	0.78	1.180
	140	28.25	26	22	2.5	2	157	195	2,600	3,400	**30216**	**7216E**	95	91	130	132	4	6	2	2	28.1	0.42	1.4	0.79	1.650
	140	35.25	33	28	2.5	2	192	254	2,600	3,400	**32216**	**7516E**	95	90	130	134	4	7	2	2	30.6	0.42	1.4	0.79	2.162
	170	42.5	39	33	3	2.5	276	330	2,200	3,000	**30316**	**7316E**	98	102	158	159	4	9.5	2.5	2	34.0	0.35	1.7	0.96	4.486
	170	42.5	39	27	3	2.5	235	285	2,000	2,800	**31316**	**27316E**	104	97	158	159	6	15.5	2.5	2	51.8	0.83	0.73	0.4	4.065
	170	61.5	58	48	3	2.5	385	505	2,200	3,000	**32316**	**7616E**	101	98	158	159	4	13.5	2.5	2	41.3	0.35	1.7	0.96	6.390
85	130	29	29	22	1.5	1.5	143	231	2,600	3,600	**32017**	**2007117**	96	94	121	125	6	7	1.5	1.5	28.2	0.44	1.4	0.75	1.250
	150	30.5	28	24	2.5	2	184	233	2,400	3,200	**30217**	**7217E**	100	97	140	141	5	6.5	2	2	30.3	0.42	1.4	0.79	2.060
	150	38.5	36	30	2.5	2	210	277	2,400	3,200	**32217**	**7517E**	100	96	140	142	5	8.5	2	2	33.8	0.42	1.4	0.79	2.670
	180	44.5	41	34	4	3	310	375	2,000	2,800	**30317**	**7317E**	106	108	166	167	5	10.5	3	2.5	35.7	0.35	1.7	0.96	5.305
	180	44.5	41	28	4	3	261	315	2,000	2,600	**31317**	**27317E**	113	103	166	169	6	16.5	3	2.5	55.2	0.83	1.74	0.96	4.881
	180	63.5	60	49	4	3	410	535	2,000	2,800	**32317**	**7617E**	110	104	166	167	5	14.5	3	2.5	43.5	0.35	1.7	0.96	7.302
90	140	32	32	24	2	1.5	170	273	2,400	3,200	**32018**	**2007118**	102	99	131	134	6	8	2	1.5	29.7	0.42	1.4	0.78	1.700
	160	32.5	30	26	2.5	2	201	256	2,200	3,000	**30218**	**7218E**	105	103	150	150	5	6.5	2	2	31.7	0.42	1.4	0.79	2.558
	160	42.5	40	34	2.5	2	256	350	2,200	3,000	**32218**	**7518E**	105	102	150	152	5	8.5	2	2	36.1	0.42	1.4	0.79	3.265
	190	46.5	43	36	4	3	305	360	1,900	2,600	**30318**	**7318E**	111	115	176	177	5	10.5	3	2.5	37.6	0.35	1.7	0.95	6.144
	190	46.5	43	30	4	3	265	315	1,800	2,400	**31318**	**27318E**	118	110	176	179	6	16.5	3	2.5	58.5	0.83	0.73	0.4	5.511
	190	67.5	64	53	4	3	450	590	2,000	2,600	**32318**	**7618E**	115	109	176	177	5	14.5	3	2.5	46.5	0.35	1.7	0.96	8.568

Metric series

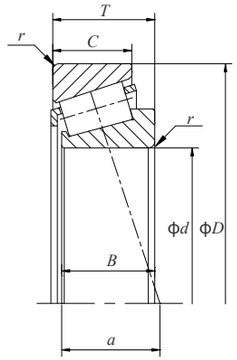


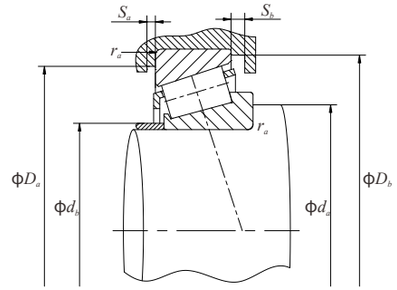


d 95~120 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Mounting dimensions (mm)								Application point position mm	Constant	Axial load coefficient		Reference mass (kg)
					r(Min)								d_a	d_b	D_a	D_b	S_a	S_b	Inner ring r_a	Outer ring r_a					
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{or}	Grease	Oil			Min	Max	Max	Min	Min	Min	(Max)		a	e	Y_1	Y_0	
95	145	32	32	24	2	1.5	173	283	2,400	3,200	**32019**	**2007119**	107	104	136	140	6	8	2	1.5	31.2	0.44	1.4	0.75	1.700
	170	34.5	32	27	3	2.5	223	286	2,200	2,800	**30219**	**7219E**	113	110	158	159	5	7.5	2.5	2	33.7	0.42	1.4	0.79	3.269
	170	45.5	43	37	3	2.5	289	400	2,200	2,800	**32219**	**7519E**	113	108	158	161	5	8.5	2.5	2	39.3	0.42	1.4	0.79	4.216
	200	49.5	45	38	4	3	335	400	1,900	2,400	**30319**	**7319E**	116	119	186	184	5	11.5	3	2.5	39.7	0.35	1.7	0.95	6.546
	200	49.5	45	32	4	3	310	375	1,800	2,400	**31319**	**27319E**	123	115	186	187	6	17.5	3	2.5	61.9	0.83	0.73	0.4	6.635
	200	71.5	67	55	4	3	460	600	1,900	2,400	**32319**	**7619E**	120	114	186	184	5	16.5	3	2.5	48.5	0.35	1.7	0.95	9.645
100	150	32	32	24	2	1.5	176	294	2,200	3,000	**32020**	**2007120**	112	109	141	144	6	8	2	1.5	32.5	0.46	1.3	0.72	1.947
	180	37	34	29	3	2.5	255	330	2,000	2,600	**30220**	**7220E**	118	116	168	168	5	8	2.5	2	36.1	0.42	1.4	0.79	3.976
	180	49	46	39	3	2.5	325	450	2,000	2,600	**32220**	**7520E**	118	115	168	171	5	10	2.5	2	41.5	0.42	1.4	0.79	5.213
	215	51.5	47	39	4	3	365	435	1,700	2,400	**30320**	**7320E**	121	128	201	196	5	12.5	3	2.5	41.7	0.35	1.7	0.95	8.690
	215	56.5	51	35	4	3	350	435	1,600	2,000	**31320**	**27320E**	114	121	201	202	7	21.5	3	2.5	69.0	0.83	0.73	0.4	8.600
	215	77.5	73	60	4	3	565	755	1,700	2,400	**32320**	**7620E**	125	125	201	200	5	17.5	3	2.5	53.2	0.35	1.7	0.96	12.96
105	160	35	35	26	2.5	2	204	340	2,000	2,800	**32021**	**2007121**	120	115	150	154	6	9	2	2	34.3	0.44	1.4	0.74	2.500
	190	39	36	30	3	2.5	280	365	1,900	2,600	**30221**	**7221E**	123	123	178	177	6	9	2.5	2	38.1	0.42	1.4	0.79	4.510
	190	53	50	43	3	2.5	360	510	1,900	2,600	**32221**	**7521E**	123	120	178	180	5	10	2.5	2	44.8	0.42	1.4	0.79	6.260
	225	53.5	49	41	4	3	395	470	1,600	2,200	**30321**	**7321E**	126	134	211	206	6	12.5	3	2.5	43.5	0.35	1.7	0.95	9.120
	225	58	53	36	4	3	380	470	1,700	2,300	**31321**	**27321E**	119	126	211	211	7	22	3	2.5	71.5	0.83	0.73	0.4	9.680
	225	81.5	77	63	4	3	585	780	1,700	2,200	**32321**	**7621E**	130	129	211	209	6	18.5	3	2.5	55.0	0.35	1.7	0.95	14.21
110	170	38	38	29	2.5	2	236	390	2,000	2,600	**32022**	**2007122**	125	121	160	163	7	9	2	2	35.9	0.43	1.4	0.77	3.100
	200	41	38	32	3	2.5	315	420	1,800	2,400	**30222**	**7222E**	128	129	188	187	6	9	2.5	2	40.1	0.42	1.4	0.79	5.270
	200	56	53	46	3	2.5	400	565	1,800	2,400	**32222**	**7522E**	128	127	188	190	5	10	2.5	2	47.2	0.42	1.4	0.79	7.360
	240	54.5	50	42	4	3	485	595	1,500	2,000	**30322**	**7322E**	131	143	226	220	6	12.5	3	2.5	45.1	0.35	1.7	0.96	11.45
	240	63	57	38	4	3	430	563	1,400	1,900	**31322**	**27322E**	124	135	226	224	7	25	3	2.5	76.0	0.83	0.73	0.4	12.20
	240	84.5	80	65	4	3	675	910	1,500	2,000	**32322**	**7622E**	135	139	226	222	6	19.5	3	2.5	58.5	0.35	1.7	0.96	18.78
120	180	38	38	29	2.5	2	242	405	1,800	2,400	**32024**	**2007124**	135	131	170	173	7	9	2	2	39.7	0.46	1.3	0.72	3.100
	215	43.5	40	34	3	2.5	335	450	1,600	2,200	**30224**	**7224E**	138	141	203	201	6	9.5	2.5	2	44.4	0.44	1.4	0.76	6.125
	215	61.5	58	50	3	2.5	440	635	1,600	2,200	**32224**	**7524E**	138	137	203	204	6	11.5	2.5	2	52.0	0.44	1.4	0.76	9.169
	260	59.5	55	46	4	3	535	655	1,400	1,900	**30324**	**7324E**	141	154	246	237	6	13.5	3	2.5	50.0	0.35	1.7	0.96	13.7
	260	68	62	42	4	3	526	665	1,300	1,800	**31324**	**27324E**	134	145	246	244	9	26	3	2.5	82.5	0.83	0.73	0.4	15.4
	260	90.5	86	69	4	3	770	1060	1,400	1,900	**32324**	**7624E**	145	149	246	239	6	21.5	3	2.5	62.4	0.35	1.7	0.96	21.7

Metric series

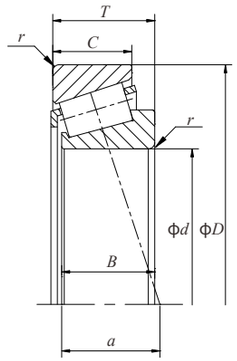


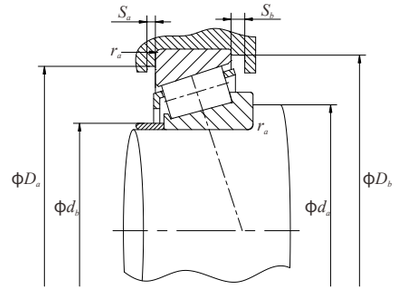


d 130~170 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Mounting dimensions (mm)								Application point position mm	Constant	Axial load coefficient		Reference mass (kg)
					r(Min)								d_a	d_b	D_a	D_b	S_a	S_b	Inner ring r_a	Outer ring r_a					
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil			Min	Max	Max	Min	Min	Min	(Max)		a	e	Y_1	Y_0	
130	200	45	45	34	2.5	2	320	535	1,600	2,200	**32026**	**2007126**	145	144	190	192	8	11	2	2	43.9	0.43	1.4	0.76	5.06
	230	43.75	40	34	4	3	375	505	1,500	2,000	**30226**	**7226E**	151	151	216	217	7	9.5	3	2.5	45.8	0.44	1.4	0.76	7.24
	230	67.75	64	54	4	3	530	790	1,500	2,000	**32226**	**7526E**	151	147	216	219	7	13.5	3	2.5	56.9	0.44	1.4	0.76	11.37
	280	63.75	58	49	5	4	545	675	1,300	1,800	**30326**	**7326E**	157	168	262	255	8	14.5	4	3	53.9	0.36	1.7	0.92	17.1
	280	72	66	44	5	4	589	748	1,200	1,600	**31326**	**27326E**	148	152	262	261	9	28	4	3	87.5	0.83	0.73	0.4	18.9
	280	98.75	93	78	5	4	830	1150	1,300	1,800	**32326**	**7626E**	162	165	262	263	8	20.5	4	3	69.2	0.36	1.7	0.92	26.6
140	210	45	45	34	2.5	2	325	555	1,600	2,200	**32028**	**2007128**	155	152	200	202	8	11	2	2	46.6	0.46	1.3	0.72	5.21
	250	45.75	42	36	4	3	390	515	1,400	1,900	**30228**	**7228E**	161	164	236	234	7	9.5	3	2.5	48.9	0.44	1.4	0.76	8.892
	250	71.75	68	58	4	3	610	915	1,400	1,900	**32228**	**7528E**	161	159	236	238	9	13.5	3	2.5	58.9	0.40	1.5	0.82	14.68
	300	67.75	62	53	5	4	600	740	1,200	1,600	**30328**	**7328E**	167	180	282	272	9	14.5	4	3	57.4	0.36	1.7	0.92	21.7
	300	77	70	47	5	4	674	865	1,100	1,500	**31328**	**27328E**	158	165	282	280	9	30	4	3	94.0	0.83	0.73	0.4	23.3
	300	107.75	102	85	5	4	985	1440	1,200	1,600	**32328**	**7628E**	172	177	282	281	9	22.5	4	3	76.4	0.37	1.6	0.88	33.9
150	225	48	48	36	3	2.5	375	650	1,400	2,000	**32030**	**2007130**	168	164	213	216	8	12	2.5	2	49.8	0.46	1.3	0.72	6.2
	270	49	45	38	4	3	435	570	1,300	1,700	**30230**	**7230E**	171	176	256	251	7	11	3	2.5	50.2	0.43	1.4	0.77	10.3
	270	77	73	60	4	3	595	900	1,300	1,700	**32230**	**7530E**	171	177	256	254	8	17	3	2.5	64.0	0.40	1.5	0.82	17.4
	320	72	65	55	5	4	690	860	1,100	1,500	**30330**	**7330E**	177	193	302	292	8	17	4	3	61.4	0.36	1.7	0.92	24.4
	320	82	75	50	5	4	763	898	980	1,400	**31330**	**27330E**	172	179	302	301	9	27	4	3	100.0	0.83	0.73	0.4	28.0
	320	114	108	90	5	4	1,120	1,700	1,100	1,500	**32330**	**7630E**	182	191	302	297	8	24	4	3	81.5	0.37	1.6	0.88	41.4
160	240	51	51	38	3	2.5	425	750	1,300	1,800	**32032**	**2007132**	178	175	228	231	8	13	2.5	2	53.0	0.46	1.3	0.72	8.0
	290	52	48	40	4	3	470	610	1,200	1,600	**30232**	**7232E**	181	192	276	272	8	12	3	2.5	55.0	0.43	1.4	0.77	12.9
	290	84	80	67	4	3	725	1,120	1,200	1,600	**32232**	**7532E**	181	190	276	275	10	17	3	2.5	70.1	0.40	1.5	0.82	21.1
	340	75	68	58	5	4	765	960	1,000	1,400	**30332**	**7332E**	187	205	322	311	10	17	4	3	64.6	0.36	1.7	0.92	33.5
	340	121	114	95	5	4	1,210	1,770	1,000	1,400	**32332**	**7632E**	192	202	322	319	10	26	4	3	87.1	0.37	1.6	0.88	47.9
170	260	57	57	43	3	2.5	505	890	1,200	1,700	**32304**	**2007134**	188	187	248	249	10	14	2.5	2	56.6	0.44	1.4	0.74	11.0
	310	57	52	43	5	4	525	690	1,100	1,500	**30234**	**7234E**	197	203	292	288	8	14	4	3	59.8	0.43	1.4	0.77	16.1
	310	91	86	71	5	4	835	1320	1,100	1,500	**32234**	**7534E**	197	201	292	293	10	20	4	3	73.9	0.40	1.5	0.82	28.5
	360	80	72	62	5	4	845	1,080	950	1,300	**30334**	**7334E**	197	221	342	332	10	18	4	3	70.1	0.37	1.6	0.90	33.4
	360	127	120	100	5	4	1,370	2,050	1,000	1,300	**32334**	**7634E**	202	213	342	337	10	27	4	3	91.3	0.37	1.6	0.88	56.8

Metric series

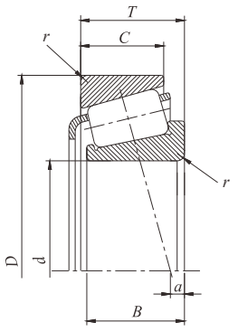


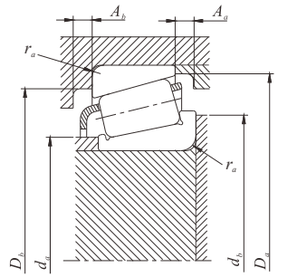


d 180~200 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Nominal numbers (old)	Mounting dimensions (mm)								Application point position mm	Constant	Axial load coefficient		Reference mass (kg)
					r(Min)								d_a	d_b	D_a	D_b	S_a	S_b	r_a (Max)						
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil			Min	Max	Max	Min	Min	Min	Inner ring	Outer ring	a	e	Y_1	Y_0	
180	280	64	64	48	3	2.5	640	1,130	1,200	1,600	**32036**	**2007136**	198	199	268	267	10	16	2.5	2	60.4	0.42	1.42	0.78	14.1
	320	57	52	43	5	4	520	695	1,100	1,400	**30236**	**7236E**	207	213	302	297	9	14	4	3	62.1	0.44	1.4	0.74	18.1
	320	91	86	71	5	4	875	1380	1,000	1,400	**32236**	**7536E**	207	211	302	305	10	20	4	3	75.2	0.40	1.5	0.82	28.2
	380	83	75	64	5	4	935	1,230	940	1,300	**30336**	**7336E**	207	233	362	345	10	19	4	3	72.4	0.36	1.7	0.92	39.7
	380	134	126	106	5	4	1,520	2,290	950	1,300	**32336**	**7636E**	212	225	362	353	10	28	4	3	96.6	0.37	1.6	0.88	67
190	340	60	55	46	5	4	580	790	1,300	1,300	**30238**	**7238E**	217	228	322	316	9	14	4	3	62.7	0.40	1.5	0.82	21.7
	340	97	92	75	5	4	980	1,550	1,000	1,300	**32238**	**7538E**	217	223	322	323	11	22	4	3	79.0	0.40	1.5	0.82	35.7
	400	86	78	65	6	5	1,010	1,340	850	1,200	**30338**	**7338E**	223	248	378	366	11	21	5	4	76.1	0.36	1.7	0.92	46.2
	400	140	132	109	6	5	1,660	2,580	850	1,200	**32338**	**7638E**	229	243	378	375	11	31	5	4	102.7	0.73	1.6	0.88	76.6
200	360	64	58	48	5	4	645	890	900	1,300	**30240**	**7240E**	227	242	342	334	10	16	4	3	65.5	0.40	1.5	0.82	25.7
	360	104	98	82	5	4	1,090	1,750	950	1,300	**32240**	**7540E**	227	233	342	338	11	22	4	3	85.0	0.40	1.5	0.82	44.7
	420	89	80	67	6	5	1,030	1,390	850	1,200	**30340**	**7340E**	233	253	398	368	11	22	5	4	81.4	0.37	1.6	0.88	53.5
	420	146	138	115	6	5	1,820	2,870	800	1,100	**32340**	**7640E**	239	253	398	392	11	31	5	4	106.7	0.37	1.6	0.88	91

Inch series





d 15.875~25.400 mm

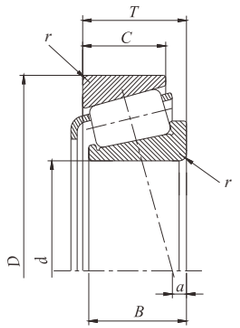
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	a[1]	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
15.875	42.862	14.288	14.288	9.525	1.5	1.5	17.4	17.4	10,000	14,000	**11590—11520**	1.3	0.70	0.85	0.47	22.5	24.5	1.5	39.5	34.5	1.5	4.5	2.0	0.10
16.000	47.000	21.000	21.000	16.000	1.0	1.0	37.1	39.3	9,800	13,000	**HM81649—HM81610**	6.1	0.55	1.10	0.60	23.0	27.5	1.0	43.0	37.5	1.0	5.0	3.0	0.18
17.462	39.878	13.843	14.605	10.688	1.3	1.3	22.9	23.4	11,000	14,000	**LM11749—LM11710**	5.1	0.29	2.00	1.10	21.5	23.0	1.3	37.0	34.0	1.3	4.0	3.0	0.08
19.050	45.237	15.494	16.637	12.065	1.3	1.3	30.6	32.0	9,400	13,000	**LM11949—LM11910**	5.6	0.30	2.00	1.10	23.5	25.0	1.3	41.5	39.5	1.3	4.5	3.5	0.12
	49.225	19.845	21.539	14.288	1.3	1.3	39.7	40.5	8,900	12,000	**09078—09195**	9.1	0.27	2.26	1.24	24.0	25.5	1.3	44.5	42.0	1.3	4.5	4.0	0.18
	49.225	21.209	19.050	17.462	1.3	1.5	39.7	40.5	8,900	12,000	**09067—09196**	7.4	0.27	2.26	1.24	24.0	25.5	1.3	44.5	41.5	1.5	4.5	1.0	0.19
	53.975	22.225	21.839	15.875	1.5	2.3	43.0	42.5	8,400	11,000	**21075—21212**	5.8	0.59	1.02	0.56	26.0	31.5	1.5	50.0	43.0	2.3	4.5	4.0	0.24
20.000	50.005	13.495	14.260	9.525	1.5	1.0	27.0	29.6	7,900	11,000	**07079—07196**	2.8	0.40	1.49	0.82	26.0	27.5	1.5	47.0	44.5	5.0	4.0	1.5	0.14
20.625	49.225	19.845	21.539	14.288	1.5	1.3	39.7	40.5	8,000	11,000	**09081—09195**	9.1	0.27	2.26	1.24	25.5	27.5	1.5	44.5	42.0	1.3	4.5	4.0	0.17
21.430	50.005	17.526	18.288	13.970	1.3	1.3	40.8	43.5	8,600	12,000	**M12649— M12160**	6.4	0.28	2.16	1.18	25.5	29.0	1.3	46.0	44.0	1.3	4.5	3.5	0.16
21.986	45.237	15.494	16.637	12.065	1.3	1.3	30.2	35.3	8,900	12,000	**LM12749—LM12710**	5.3	0.31	1.96	1.08	26.0	27.5	1.3	42.0	39.5	1.3	4.0	3.0	0.12
	45.974	15.494	16.637	12.065	1.3	1.3	30.2	35.3	8,900	12,000	**LM12749—LM12711**	5.3	0.31	1.96	1.08	26.0	27.5	1.3	42.5	40.0	1.3	4.0	3.0	0.12
22.225	50.005	17.526	18.288	13.970	1.3	1.3	40.8	43.5	8,500	11,000	**M12648—M12610**	6.4	0.28	2.16	1.19	26.5	28.5	1.3	46.0	44.0	1.3	4.5	3.5	0.17
	52.388	19.638	20.168	14.288	1.5	1.5	44.3	48.3	8,000	11,000	**1380—1328**	7.6	0.29	2.05	1.13	27.0	29.5	1.5	48.5	45.0	1.5	5.0	3.5	0.20
	53.975	19.368	20.168	14.288	1.5	1.5	44.3	48.3	8,000	11,000	**1380—1329**	7.6	0.29	2.05	1.13	27.0	29.5	1.5	49.0	46.0	1.5	5.0	3.5	0.22
	56.896	19.368	19.837	15.875	1.3	1.3	42.0	45.3	7,600	10,000	**1755—1729**	6.9	0.31	1.95	1.07	27.5	29.0	1.3	51.0	49.0	1.3	4.0	3.5	0.24
	57.150	22.225	22.225	17.462	0.8	1.5	51.2	55.1	7,600	10,000	**1280—1220**	6.9	0.35	1.73	0.95	29.0	29.5	0.8	52.0	49.0	1.5	5.5	2.5	0.28
	66.421	23.812	25.433	19.050	1.5	1.3	71.0	81.7	6,500	8,700	**2684—2631**	9.4	0.25	2.36	1.30	29.0	31.5	1.5	60.0	58.0	1.3	6.0	4.5	0.46
22.606	47.000	15.500	15.500	12.000	1.5	1.0	27.5	33.0	8,700	12,000	**LM72489—LM72810**	3.0	0.47	1.27	0.70	28.0	30.0	1.5	44.0	40.5	1.0	4.0	2.0	0.12
23.812	50.292	14.224	14.732	10.688	1.5	1.3	27.8	32.9	7,800	10,000	**L44640—L44610**	3.3	0.37	1.60	0.88	28.5	30.5	1.5	47.0	44.5	1.3	4.0	2.5	0.12
	56.896	19.367	19.837	15.875	0.8	1.3	42.0	45.3	7,600	10,000	**1779—1729**	6.9	0.31	1.95	1.07	28.5	29.5	0.8	51.0	49.0	1.3	4.0	3.5	0.24
	65.088	22.225	21.463	15.875	1.5	1.5	50.6	55.8	5,600	7,900	**23092—23256**	2.3	0.73	0.82	0.45	34.5	38.5	1.5	63.0	53.0	1.5	4.0	3.5	0.37
24.981	50.005	13.495	14.260	9.525	1.5	1.0	27.0	29.6	7,900	11,000	**07098—07196**	2.8	0.40	1.49	0.82	29.0	31.0	1.5	47.0	44.5	1.0	5.0	4.0	0.11
	62.000	16.002	16.566	14.288	1.5	1.5	40.0	44.1	6,700	8,900	**17098—17244**	3.6	0.38	1.57	0.86	30.5	33.0	1.5	57.0	54.0	1.5	3.5	4.5	0.25
25.000	50.005	13.495	14.260	9.525	1.5	1.0	27.0	29.6	7,900	11,000	**07097—07196**	2.8	0.40	1.49	0.82	29.0	31.0	1.5	47.0	44.5	1.0	5.0	4.0	0.11
25.400	50.005	13.495	14.260	9.525	1.0	1.0	27.0	29.6	7,900	11,000	**07100—07196**	2.8	0.40	1.49	0.82	29.5	30.5	1.0	47.0	44.5	1.0	5.0	4.0	0.11

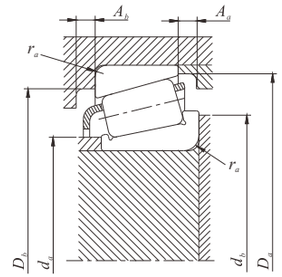
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 25.400~28.575 mm

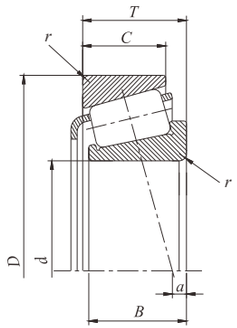
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{or}	Grease	Oil	Inner ring—Outer ring	$a^{1)}$	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
25.400	50.005	13.495	14.260	9.525	1.5	1.0	27.0	29.6	7,900	11,000	07100S—07196	2.8	0.40	1.49	0.82	29.5	31.5	1.5	47.0	44.5	1.0	5.0	4.0	0.11
	50.292	14.224	14.732	10.668	1.3	1.3	27.8	32.9	7,800	10,000	L44643—L44610	3.3	0.37	1.60	0.88	30.0	32.0	1.3	47.0	44.5	1.3	4.0	2.5	0.12
	51.994	15.011	14.260	12.700	1.0	1.3	27.0	29.6	7,900	11,000	07100—07204	2.8	0.40	1.49	0.82	29.5	30.5	1.0	48.0	45.0	1.3	3.0	2.5	0.14
	58.738	19.050	19.355	15.080	1.2	1.2	44.8	50.2	7,000	9,300	1986R—1932	5.8	0.33	1.82	1.00	30.5	32.5	1.2	54.0	52.0	1.2	5.0	3.5	0.24
	59.530	23.368	23.114	18.288	0.8	1.5	53.8	63.3	7,200	9,600	M84249—M84210	5.1	0.55	1.10	0.60	32.5	36.0	0.8	56.0	49.5	1.5	5.5	3.0	0.32
	61.912	19.050	20.638	14.288	0.8	2.0	46.8	53.9	6,400	8,600	15101—15243	5.8	0.35	1.71	0.94	31.5	32.5	0.8	58.0	54.0	2.0	5.0	5.0	0.29
	62.000	19.050	20.638	14.288	3.5	1.3	46.8	53.9	6,400	8,600	15100—15245	5.8	0.35	1.71	0.94	31.5	38.0	3.5	58.0	55.0	1.3	5.0	5.0	0.29
	63.500	19.050	20.638	14.288	0.8	1.5	46.8	53.9	6,400	8,600	15101—15250X	5.8	0.35	1.71	0.94	31.5	32.5	0.8	58.0	54.0	1.5	5.0	5.0	0.29
	64.292	21.433	21.433	16.670	1.5	1.5	55.7	71.7	6,400	8,500	M86643—M86610	3.3	0.55	1.10	0.60	36.5	38.0	1.5	61.0	54.0	1.5	5.0	3.0	0.36
	65.088	22.225	21.463	15.875	1.5	1.5	50.6	55.8	5,600	7,900	23100—23256	2.3	0.73	0.82	0.45	34.5	39.0	1.5	63.0	53.0	1.5	4.0	3.5	0.36
	66.421	23.812	25.433	19.050	1.3	1.3	71.0	81.7	6,500	8,700	2687—2631	9.4	0.25	2.36	1.30	31.5	33.5	1.3	60.0	58.0	1.3	6.0	4.5	0.44
	68.262	22.225	22.225	17.462	0.8	1.5	59.1	70.2	6,000	8,000	02473—02420	5.1	0.42	1.44	0.79	33.5	34.5	0.8	63.0	59.0	1.5	5.5	3.0	0.43
	72.233	25.400	25.400	19.842	0.8	2.3	71.1	94.2	5,700	7,600	HM88630—HM88610	4.6	0.55	1.10	0.60	39.5	39.5	0.8	69.0	60.0	2.3	5.5	4.0	0.59
26.157	61.913	19.050	20.638	14.288	0.8	2.0	46.8	53.9	6,400	8,600	15103—15243	5.8	0.35	1.71	0.94	32.5	33.0	0.8	58.0	55.0	2.0	5.0	5.0	0.29
	61.999	19.050	20.638	14.288	0.8	1.3	46.8	53.9	6,400	8,600	15103—15245	5.8	0.35	1.71	0.94	32.5	33.0	0.8	58.0	55.0	1.3	5.0	5.0	0.29
26.162	66.421	23.812	25.433	19.050	1.5	1.3	71.0	81.7	6,500	8,700	2682—2631	9.4	0.25	2.36	1.30	32.0	34.5	1.5	60.0	58.0	1.3	6.0	4.5	0.43
26.988	50.292	14.244	14.732	10.688	3.5	1.3	27.8	32.9	7,800	10,000	L44649—L44610	3.3	0.37	1.60	0.88	31.0	37.5	3.5	47.0	44.5	1.3	4.0	2.5	0.11
	60.325	19.842	17.462	15.875	3.5	1.5	42.6	50.1	7,000	9,400	15580—15523	5.1	0.35	1.73	0.95	32.0	38.5	3.5	54.0	51.0	1.5	5.0	1.5	0.25
	62.000	19.050	20.638	14.288	0.8	1.3	46.8	53.9	6,400	8,600	15106—15245	5.8	0.35	1.71	0.94	33.0	33.5	0.8	58.0	55.0	1.3	5.0	5.0	0.28
	66.421	23.812	25.433	19.050	1.5	1.3	71.0	81.7	6,500	8,700	2688—2631	9.4	0.25	2.36	1.30	33.0	35.0	1.5	60.0	58.0	1.3	6.0	4.5	0.42
28.575	57.150	17.462	17.462	13.495	3.5	1.5	42.6	50.1	7,000	9,400	15590—15520	5.1	0.35	1.73	0.95	33.5	39.5	3.5	53.0	51.0	1.5	5.0	3.5	0.19
	57.150	19.845	19.355	15.875	3.5	1.5	44.8	50.2	7,000	9,300	1988—1922	5.8	0.33	1.82	1.00	33.5	39.5	3.5	53.5	51.0	1.5	5.0	2.5	0.17
	62.000	19.050	20.638	14.288	3.5	1.3	46.8	53.9	6,400	8,600	15112—15245	5.8	0.35	1.71	0.94	34.0	40.0	3.5	58.0	55.0	1.3	5.0	5.0	0.27
	62.000	19.050	20.638	14.288	0.8	1.3	46.8	53.9	6,400	8,600	15113—15245	5.8	0.35	1.71	0.94	34.0	34.5	0.8	58.0	55.0	1.3	5.0	5.0	0.27
	64.292	21.433	21.433	16.670	1.5	1.5	55.7	71.7	6,400	8,500	M86647—M86610	3.3	0.55	1.10	0.60	38.0	40.0	1.5	61.0	54.0	1.5	5.0	3.0	0.34
	66.421	23.812	25.433	19.050	1.3	1.3	71.0	81.7	6,500	8,700	2689—2631	9.4	0.25	2.36	1.30	34.0	36.0	1.3	60.0	58.0	1.3	6.0	4.5	0.41
	68.262	22.225	22.225	17.462	0.8	1.5	59.1	70.2	6,000	8,000	02474—02420	5.1	0.42	1.77	0.81	36.0	36.5	0.8	63.0	59.0	1.5	5.5	3.0	0.41
	72.000	19.000	18.923	15.875	1.5	1.5	54.4	60.1	5,900	7,800	26112—26283	4.1	0.36	1.67	0.92	35.0	37.0	1.5	65.0	62.0	1.5	4.5	3.0	0.38
	72.626	24.608	24.257	17.462	4.8	1.5	64.6	64.1	6,100	8,600	41125—41286	4.1	0.60	1.00	0.55	36.5	48.0	4.8	68.0	61.0	1.5	6.5	4.0	0.46

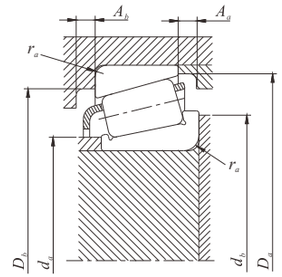
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 28.575~31.750 mm

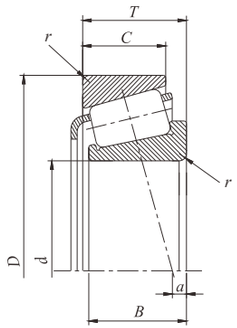
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)									Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{or}	Grease	Oil	Inner ring—Outer ring	a[1]	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
28.575	72.626	24.608	24.257	17.462	1.5	1.5	64.6	64.1	6,100	8,600	**41126—41286**	4.1	0.60	1.00	0.55	36.5	41.5	1.5	68.0	61.0	1.5	6.5	4.0	0.46
	72.626	30.162	29.997	23.812	3.5	3.3	87.7	102.0	5,800	7,700	**3192—3120**	10.2	0.33	1.80	0.99	37.0	43.5	3.5	67.0	61.0	3.3	6.5	3.0	0.61
	72.626	30.162	29.997	23.812	1.3	3.3	87.7	102.0	5,800	7,400	**3198—3120**	10.2	0.33	1.80	0.99	37.0	39.0	1.3	67.0	61.0	3.3	6.5	3.0	0.61
	73.025	22.225	22.225	17.462	0.8	3.3	60.8	74.9	5,500	7,400	**02872—02820**	3.8	0.45	1.32	0.73	37.0	37.5	0.8	68.0	62.0	3.3	5.0	3.0	1.04
	79.375	25.400	24.074	17.462	0.8	1.5	71.9	76.2	5,500	7,300	**43112—43312**	2	0.67	0.90	0.49	41.5	42.5	0.8	74.0	67.0	1.5	7.0	3.5	0.60
29.000	50.292	14.224	14.732	10.668	3.5	1.3	27.7	36.2	7,600	10,000	**L45449—L45410**	3.3	0.37	1.62	0.89	33.0	39.5	3.5	48.0	44.5	1.3	4.0	3.5	0.11
29.367	66.421	23.812	25.433	19.050	3.5	1.3	71.0	81.7	6,500	8,700	**2690—2631**	9.4	0.25	2.36	1.30	35.0	41.0	3.5	60.0	58.0	1.3	6.0	4.5	0.40
29.987	62.000	16.002	16.556	14.288	1.5	1.5	40.0	44.1	6,700	8,900	**17118—17244**	3.6	0.38	1.57	0.86	34.5	37.0	1.5	57.0	54.0	1.5	3.5	4.5	0.22
	62.000	19.050	20.638	14.288	1.3	1.3	46.8	53.9	6,400	8,600	**15117—15245**	5.8	0.35	1.71	0.94	35.0	36.5	1.3	58.0	55.0	1.3	5.0	5.0	0.26
30.000	69.012	19.845	19.583	15.875	3.5	1.3	50.6	61.7	5,900	7,800	**14117A—14276**	4.3	0.38	1.57	0.86	40.0	43.0	3.5	63.0	60.0	1.3	4.5	3.0	0.36
30.112	62.000	19.050	20.638	14.288	0.8	1.3	46.8	53.9	6,400	8,600	**15116—15245**	5.8	0.35	1.71	0.94	35.5	36.0	0.8	58.0	55.0	1.3	5.0	5.0	0.26
30.162	62.000	16.002	16.566	14.288	1.5	1.5	40.0	44.1	6,700	8,900	**17119—17244**	3.6	0.38	1.57	0.86	34.5	37.0	1.5	57.0	54.0	1.5	3.5	4.5	0.23
	64.292	21.433	21.433	16.670	1.5	1.5	55.7	71.7	6,400	8,500	**M86649—M86610**	3.3	0.55	1.10	0.60	38.2	41.0	1.5	61.0	54.0	1.5	5.0	3.0	0.33
	68.262	22.225	22.225	17.462	2.3	1.5	59.6	77.4	6,000	7,900	**M88043—M88010**	2.8	0.55	1.10	0.60	39.5	43.5	2.3	65.0	58.0	1.5	4.0	3.0	0.41
30.213	62.000	19.050	20.638	14.228	3.5	1.3	46.8	53.9	6,400	8,600	**15118—15245**	5.8	0.35	1.71	0.94	35.5	41.5	3.5	58.0	55.0	1.3	5.0	5.0	0.26
	62.000	19.050	20.638	14.228	1.5	1.3	46.8	53.9	6,400	8,600	**15119—15245**	5.8	0.35	1.71	0.94	35.5	37.5	1.5	58.0	55.0	1.3	5.0	5.0	0.26
	62.000	19.050	20.638	14.228	0.8	1.3	46.8	53.9	6,400	8,600	**15120—15245**	5.8	0.35	1.71	0.94	35.5	36.0	0.8	58.0	55.0	1.3	5.0	5.0	0.26
30.226	69.012	19.845	19.583	15.875	0.8	3.3	50.6	61.7	5,900	7,800	**14116—14274**	4.3	0.38	1.57	0.86	36.5	38.0	0.8	63.0	59.0	3.3	4.5	3.0	0.35
31.750	58.738	14.684	15.080	10.716	1.0	1.0	29.3	35.0	6,600	8,900	**08125—08231**	1.3	0.47	1.27	0.69	36.0	37.5	1.0	55.0	52.0	1.0	4.5	3.0	0.16
	59.131	15.875	16.764	11.811	** [2]	1.3	36.5	44.6	6,600	8,800	**LM67048—LM67010**	3.0	0.41	1.46	0.80	36.0	42.5	** [2]	56.0	52.0	1.3	4.5	3.5	0.17
	62.000	18.161	19.050	14.288	**	1.3	46.8	53.9	6,400	8,600	**15123—15245**	4.8	0.35	1.71	0.94	36.5	42.5	**	58.0	55.0	1.3	5.0	5.0	0.23
	62.000	19.050	20.638	14.288	3.5	1.3	46.8	53.9	6,400	8,600	**15125—15245**	5.8	0.35	1.71	0.94	36.5	42.5	3.5	58.0	55.0	1.3	5.0	5.0	0.24
	62.000	19.050	19.050	14.288	0.8	1.3	46.8	53.9	6,400	8,600	**15126—15245**	5.8	0.35	1.71	0.94	36.5	37.0	0.8	58.0	55.0	1.3	5.0	5.0	0.25
	66.421	25.400	25.357	20.638	0.8	3.3	77.5	94.4	6,000	8,000	**2580—2520**	8.6	0.27	2.19	1.21	37.5	38.5	0.8	62.0	56.9	3.3	5.5	3.0	0.39
	68.262	22.225	22.225	17.462	1.5	1.5	59.6	77.4	6,000	7,900	**M88046—M88010**	2.8	0.55	1.10	0.60	40.5	43.0	1.5	65.0	58.0	1.5	4.0	3.0	0.40
	68.262	22.225	22.225	17.462	3.5	1.5	59.1	70.2	6,000	8,000	**02475—02420**	5.1	0.42	1.44	0.79	38.5	44.5	3.5	63.0	59.0	1.5	5.5	3.0	0.37

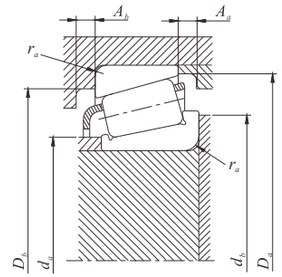
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 31.750~34.980 mm

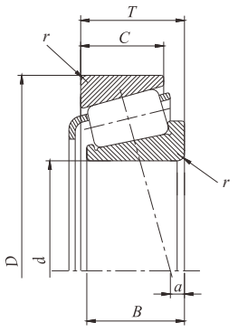
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	a[1]	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
31.750	68.262	22.225	22.225	17.462	0.8	1.5	59.1	70.2	6,000	8,000	02476—02420	5.1	0.42	1.44	0.79	38.5	44.5	0.8	63.0	59.0	1.5	5.5	3.0	0.38
	73.025	22.225	22.225	17.462	3.5	3.3	60.8	74.9	5,600	7,400	02875—02820	3.8	0.45	1.32	0.73	39.5	45.5	3.5	68.0	62.0	3.3	5.0	3.0	0.44
	73.025	22.225	22.225	17.462	0.8	3.3	60.8	74.9	5,600	7,400	02876—02820	3.8	0.45	1.32	0.73	39.5	40.0	0.8	68.0	62.0	3.3	5.0	3.0	0.45
	73.025	29.370	27.783	23.020	1.3	3.3	80.6	111	5,600	7,500	HM88542—HM88510	5.6	0.55	1.10	0.60	42.5	45.5	1.3	70.0	59.0	3.3	6.5	2.0	0.61
	73.812	29.370	27.783	23.020	1.3	0.8	80.6	111	5,600	7,500	HM88542—HM88511	5.6	0.55	1.10	0.60	42.5	45.5	1.3	70.0	62.0	0.8	6.5	2.0	0.62
	79.375	25.400	24.074	17.462	1.5	1.5	71.9	76.2	5,500	7,300	43125—43312	2.0	0.67	0.90	0.49	41.5	44.0	1.5	74.0	67.0	1.5	7.0	3.5	0.57
33.338	68.262	22.225	22.225	17.462	0.8	1.5	59.6	77.4	6,020	7,900	M88048—M88010	2.8	0.55	1.10	0.60	41.0	42.5	0.8	65.0	58.0	1.5	4.0	3.0	0.37
	72.000	19.000	18.923	15.875	3.5	1.5	54.4	60.1	5,900	7,800	26131—26283	4.2	0.36	1.67	0.92	38.5	44.5	3.5	65.0	62.0	1.5	4.5	3.0	0.34
	73.025	29.370	27.783	23.020	0.8	3.3	80.6	111	5,600	7,500	HM88547—HM88510	5.6	0.55	1.10	0.60	42.6	45.5	0.8	70.0	59.0	3.3	6.5	2.0	0.59
	76.200	29.370	28.575	23.020	0.8	3.3	86.2	119	5,400	7,200	HM89443—HM89410	5.6	0.55	1.10	0.60	44.5	46.5	0.8	73.0	62.0	3.3	5.5	3.0	0.66
	79.375	25.400	24.074	17.462	3.5	1.5	71.9	76.2	5,500	7,300	43131—43312	2.0	0.67	0.90	0.49	42.0	51.0	3.5	74.0	67.0	1.5	7.0	3.5	0.55
	79.375	25.400	24.074	17.462	2.0	1.5	71.9	76.2	5,500	7,300	43132—43312	2.0	0.67	0.90	0.49	42.0	48.0	2.0	74.0	67.0	1.5	7.0	3.5	0.56
	88.501	25.400	23.698	17.462	2.0	1.5	77.9	88.6	3,900	5,500	43131—43318	2.3	0.78	0.77	0.42	48.0	51.0	2.0	84.0	75.0	1.5	5.5	4.0	0.76
34.925	65.088	18.034	18.288	13.970	** [2]	1.3	50.5	63.1	6,000	8,000	LM48548—LM48510	3.6	0.38	1.59	0.88	40.0	46.0	** [2]	61.0	58.0	1.3	4.5	3.0	0.26
	69.012	19.845	19.583	15.875	1.5	1.3	50.6	61.7	5,900	7,800	14137A—14276	4.3	0.38	1.57	0.86	40.0	42.0	1.5	63.0	60.0	1.3	4.5	3.0	0.32
	72.233	25.400	25.400	19.842	2.3	2.3	71.1	94.2	5,700	7,600	HM88649—HM88610	4.6	0.55	1.10	0.6	42.5	48.5	2.3	69.0	60.0	2.3	5.5	4.0	0.50
	72.238	20.638	20.638	15.875	3.5	1.3	52.4	65.8	5,600	7,400	16137—16284	4.1	0.40	1.49	0.82	40.5	47.0	3.5	67.0	63.0	1.3	5.5	3.0	0.38
	73.025	22.225	22.225	17.462	3.5	3.3	60.8	74.9	5,500	7,400	02877—02820	3.8	0.45	1.32	0.73	42.0	48.5	3.5	68.0	62.0	3.3	5.0	3.0	0.41
	73.025	22.225	22.225	17.462	0.8	3.3	60.8	74.9	5,500	7,400	02878—02820	3.8	0.45	1.32	0.73	42.0	42.5	0.8	68.0	62.0	3.3	5.0	3.0	0.42
	73.025	23.812	24.608	19.050	1.5	0.8	78.8	97.4	5,600	7,400	25877—25821	8.1	0.29	2.07	1.14	40.5	43.0	1.5	68.0	65.0	0.8	5.5	4.5	0.46
	76.200	23.812	25.654	19.050	5.0	3.3	80.4	102	5,300	7,000	2786—2720	8.1	0.30	1.98	0.82	41.0	51.0	5.0	70.0	66.0	3.3	5.0	5.0	0.52
	76.200	29.370	28.575	23.812	3.5	3.3	87.7	107	5,400	7,200	31594—31520	7.6	0.40	1.49	1.09	43.5	46.0	1.5	72.0	64.0	3.3	6.0	2.5	0.61
	79.375	29.370	29.711	23.812	3.5	3.3	96.9	119	5,400	7,200	3478—3420	8.6	0.37	1.64	0.82	43.5	50.0	3.5	74.0	67.0	3.3	6.0	3.5	0.70
	80.035	21.433	20.940	15.875	1.5	1.5	58.8	68.9	5,200	6,900	28137—28317	4.8	0.40	1.49	0.90	41.0	43.5	1.5	73.0	69.0	1.5	4.5	3.0	0.50
	95.250	27.782	29.900	22.225	0.8	2.3	118	144	4,500	5,900	449—432	9.1	0.28	2.11	1.16	43.5	44.0	0.8	87.0	83.0	2.3	6.0	5.0	1.07
34.980	59.131	15.875	16.764	11.938	** [2]	1.3	35.5	49.3	6,400	8,500	L68149—L68110	2.5	0.42	1.44	0.79	39.0	45.5	** [2]	56.0	53.0	1.3	4.0	3.0	0.18
	59.975	15.875	16.764	11.938	**	1.3	35.5	49.3	6,400	8,500	L68149—L68111	2.5	0.42	1.44	0.79	39.0	45.5	**	56.0	53.0	1.3	4.0	3.0	0.18

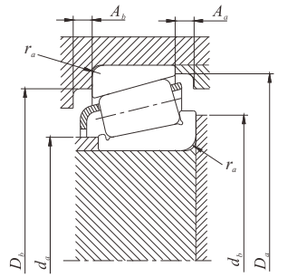
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 35.000~38.100 mm

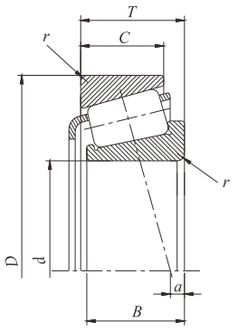
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)									Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	a[1]	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
35.000	79.375	23.812	25.400	19.050	0.8	0.8	84.3	110	5,000	6,700	26883—26822	7.4	0.32	1.88	1.04	42.0	42.5	0.8	74.0	71.0	0.8	5.0	4.5	0.60
	80.000	21.000	22.403	17.826	0.8	1.3	73.6	83.4	4,900	6,000	339—332	6.2	0.27	2.20	1.21	41.5	42.5	0.8	75.0	73.0	1.3	5.0	4.5	0.53
35.717	72.233	25.400	25.400	19.842	3.5	2.3	71.1	94.2	5,700	7,600	HM88648—HM88610	4.6	0.55	1.10	0.60	43.0	52.0	3.5	69.0	60.0	2.3	5.5	4.0	0.48
36.487	73.025	23.812	24.608	19.050	1.5	0.8	78.8	97.4	5,600	7,400	25880—25821	8.1	0.29	2.07	1.14	42.0	44.0	1.5	68.0	65.0	0.8	5.5	4.5	0.45
	76.200	23.812	25.654	19.050	1.5	3.3	80.4	102	5,400	7,200	2780—2720	8.1	0.3	1.98	1.09	42.5	44.5	1.5	70.0	66.0	3.3	5.0	5.0	0.52
36.512	76.200	29.370	28.575	23.020	3.5	0.8	86.2	119	5,400	7,200	HM89449—HM89441	5.6	0.55	1.10	0.60	44.5	54.0	3.5	73.0	65.0	0.8	5.5	3.0	0.62
	79.375	23.812	25.400	19.050	0.8	0.8	84.3	110	5,000	6,700	26877—26822	7.4	0.32	1.88	1.04	43.0	44.0	0.8	74.0	71.0	0.8	5.0	4.5	0.59
	79.375	29.370	29.771	23.812	0.8	3.3	96.9	119	5,200	6,900	3479—3420	8.6	0.37	1.64	0.90	44.5	45.5	0.8	74.0	67.0	3.3	6.0	3.5	0.68
	85.725	30.162	30.162	23.812	0.8	3.3	115	148	4,800	6,400	3878—3820	8.1	0.40	1.49	0.82	47.0	48.0	0.8	81.0	73.0	3.3	7.0	4.5	0.89
	88.500	25.400	23.698	17.462	2.3	1.5	77.9	88.6	3,900	5,500	44143—44348	-2.3	0.78	0.77	0.42	50.0	54.0	2.3	84.0	75.0	1.5	5.5	4.0	0.72
38.000	63.000	17.000	17.000	13.500	** [2]	1.3	39.8	55.0	6,000	8,000	JL69349—JL69310	2.3	0.42	1.44	0.79	42.5	49.0	** [2]	60.0	56.0	1.3	4.0	3.0	0.19
38.100	63.500	12.700	11.908	9.525	1.5	0.8	25.1	33.0	5,800	7,700	13889—13830	0.8	0.35	1.73	0.95	42.5	45.0	1.5	60.0	59.0	0.8	4.0	2.0	0.14
	65.088	12.700	11.908	9.525	1.5	0.8	25.1	33.0	5,800	7,700	13889—13836	0.8	0.35	1.73	0.95	42.5	45.0	1.5	61.0	59.0	0.8	4.0	2.0	0.15
	65.088	18.034	18.288	13.970	** [2]	1.3	45.0	60.3	5,800	7,800	LM29748—LM29710	4.1	0.33	1.80	0.99	42.5	49.0	** [2]	62.0	59.0	1.3	4.5	3.0	0.22
	65.088	19.812	18.288	15.748	2.3	1.3	45.0	60.3	5,800	7,800	LM29749—LM29711	4.1	0.33	1.80	0.99	42.5	46.0	2.3	62.0	58.0	1.3	4.5	1.5	0.24
	69.012	19.050	19.050	15.083	2.0	2.3	52.5	67.9	5,600	7,500	13687—13621	3.0	0.40	1.49	0.82	43.0	46.5	2.0	65.0	61.0	2.3	4.0	2.5	0.29
	71.438	15.875	16.520	11.908	1.5	1.0	46.9	57.8	5,700	7,600	19150—19281	1.5	0.44	1.35	0.74	43.0	45.0	1.5	66.0	63.0	1.0	4.0	4.0	0.27
	71.996	17.018	16.520	14.288	1.5	1.5	46.9	57.8	5,700	7,600	19150—19283	1.5	0.44	1.35	0.74	43.0	45.0	1.5	66.0	63.0	1.5	2.5	3.0	0.30
	72.000	19.000	20.638	14.237	3.5	1.5	52.4	65.8	5,600	7,400	16150—16282	4.1	0.40	1.49	0.82	43.0	49.5	3.5	67.0	63.0	1.5	5.5	4.5	0.33
	72.238	20.638	20.638	15.875	3.5	1.3	52.4	65.8	5,600	7,400	16150—16284	4.1	0.40	1.49	0.82	43.0	49.5	3.5	67.0	63.0	1.3	5.5	3.0	0.35
	76.200	23.812	25.654	19.050	3.5	3.3	80.4	102	5,400	7,200	2788—2720	8.1	0.30	1.98	1.09	43.5	50.0	3.5	77.0	66.0	3.3	5.0	5.0	0.49
	79.375	29.370	29.771	23.812	3.5	3.3	96.9	119	5,200	6,900	3490—3420	8.6	0.37	1.64	0.90	45.5	52.0	3.5	74.0	67.0	3.3	6.0	3.5	0.65
	80.035	21.006	20.940	15.875	1.5	1.5	58.8	68.9	5,300	7,000	28150—28315	4.8	0.40	1.49	0.82	43.5	45.5	1.5	73.0	69.0	1.5	4.5	3.5	0.46
	80.035	24.608	23.698	18.512	0.8	1.5	72.2	91.1	5,200	6,900	27880—27820	2.5	0.56	1.07	0.59	47.0	48.0	0.8	75.0	68.0	1.5	4.5	2.5	0.56
	80.035	24.608	23.698	18.512	3.5	1.5	72.2	91.1	5,200	6,900	27881—27820	2.5	0.56	1.07	0.59	47.0	53.0	3.5	75.0	68.0	1.5	4.5	2.5	0.55
	82.550	29.370	28.575	23.020	0.8	3.3	95.1	130	4,900	6,600	HM801346—HM801310	4.8	0.55	1.10	0.60	49.1	51.0	0.8	78.0	68.0	3.3	6.0	3.0	0.76
	82.550	29.370	28.575	23.020	2.3	3.3	95.1	130	4,900	6,600	HM801346X—HM801310	4.8	0.55	1.10	0.60	49.1	54.0	2.3	78.0	68.0	3.3	6.0	3.0	0.53

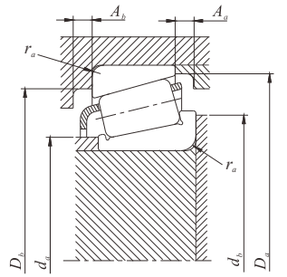
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 38.100~41.275 mm

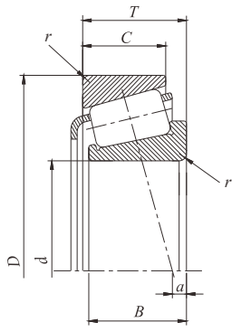
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	$a^{1)}$	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
38.100	82.931	23.812	25.400	19.050	0.8	0.8	83.8	111	4,800	6,300	**25572—25520**	6.4	0.33	1.79	0.99	46.0	46.0	0.8	77.0	74.0	0.8	5.5	4.5	0.64
	88.500	25.400	23.698	17.462	2.3	1.5	77.9	88.6	3,900	5,500	**44150—44348**	-2.3	0.78	0.77	0.42	51.0	55.0	2.3	84.0	75.0	1.5	5.5	4.0	0.71
	88.500	26.988	29.083	22.225	3.5	1.5	107	124	4,900	6,500	**418—414**	9.7	0.26	2.28	1.25	44.5	51.0	3.5	80.0	77.0	1.5	6.0	5.0	0.82
	90.488	39.688	40.386	38.338	1.5	3.3	155	204	4,500	6,000	**4375—4335**	15	0.28	2.11	1.16	48.5	51.0	1.5	85.0	77.0	3.3	6.5	3.5	1.30
	95.250	30.958	28.300	20.638	1.5	0.8	92.8	104	3,700	5,200	**53150—53375**	0.3	0.74	0.81	0.45	53.0	55.0	1.5	89.0	81.0	0.8	7.0	2.0	1.04
	101.60	34.925	36.068	26.988	3.5	3.3	152	192	4,000	5,300	**525—522**	12.7	0.29	2.10	1.16	48.0	54.0	3.5	95.0	89.0	3.3	8.0	5.5	1.47
39.688	73.025	16.667	17.462	12.700	0.8	1.5	47.0	58.1	5,200	6,900	**18587—18250**	2.8	0.35	1.71	0.94	45.0	45.5	0.8	69.0	66.0	1.5	5.5	4.0	0.29
	76.200	23.812	25.654	19.050	3.5	3.3	80.4	102	5,400	7,200	**2789—2720**	8.1	0.30	1.98	1.09	45.0	52.0	3.5	70.0	66.0	3.3	5.0	5.0	0.47
	80.167	29.370	30.391	23.812	0.8	3.3	106	129	5,000	6,700	**3886—3320**	10.9	0.27	2.20	1.21	45.5	46.5	0.8	75.0	70.0	3.3	6.0	4.5	0.65
	84.138	29.370	30.391	23.812	0.8	3.3	106	129	5,000	6,700	**3382—3328**	10.9	0.27	2.20	1.21	45.0	52.0	0.8	76.0	72.0	3.3	6.0	4.5	0.75
	88.500	25.400	23.698	17.462	3.5	1.5	77.9	88.6	3,900	5,500	**44158—44348**	-2.3	0.78	0.77	0.42	51.0	58.0	3.5	84.0	75.0	1.5	5.5	4.0	0.68
40.000	76.200	20.638	20.940	15.507	1.5	1.3	58.8	68.9	5,300	7,000	**28158—28300**	4.8	0.40	1.49	0.82	45.0	47.5	1.5	71.0	68.0	1.3	4.5	4.0	0.38
	80.000	21.000	22.403	17.826	3.5	1.3	73.6	83.4	4,900	6,600	**344—332**	6.4	0.27	2.20	1.21	45.5	52.0	3.5	75.0	73.0	1.3	5.0	4.5	0.47
	80.000	21.000	22.403	17.826	0.8	1.3	73.6	83.4	4,900	6,600	**344A—332**	6.2	0.27	2.20	1.21	45.5	46.0	0.8	75.0	73.0	1.3	5.0	4.5	0.47
	85.000	20.638	21.692	17.462	0.8	1.3	75.8	89.2	4,600	6,200	**350A—354A**	4.8	0.31	1.96	1.08	46.5	47.5	0.8	80.0	77.0	1.3	5.0	5.0	0.55
	88.500	26.988	29.083	22.225	3.5	1.5	108	124	4,900	6,500	**420—414**	9.7	0.26	2.28	1.25	46.0	52.0	3.5	80.0	77.0	1.5	6.0	5.0	0.79
	107.95	36.512	36.957	28.575	3.3	3.3	159	206	3,800	5,100	**543—532X**	12.2	0.30	2.02	1.11	50.0	57.0	3.5	100	94.0	3.3	8.0	4.0	1.74
40.483	82.550	29.370	28.575	23.020	3.5	3.3	95.1	130	4,900	6,600	**HM801349—HM801310**	4.8	0.55	1.10	0.6	49.0	58.0	3.5	78.0	68.0	3.3	6.0	3.0	0.73
41.275	73.025	16.667	17.460	12.700	3.5	1.5	47.0	58.1	5,200	6,900	**18590—18520**	2.8	0.35	1.71	0.94	46.0	53.0	3.5	69.0	66.0	1.5	5.5	4.0	0.27
	73.431	19.558	19.812	14.732	3.5	0.8	58.4	74.2	5,200	7,000	**LM501349—LM501310**	3.3	0.40	1.50	0.83	46.5	53.0	3.5	70.0	67.0	0.8	5.5	3.5	0.32
	73.431	21.430	19.812	16.604	3.5	0.8	58.4	74.2	5,200	7,000	**LM501349—LM501314**	3.3	0.40	1.50	0.83	46.5	53.0	3.5	70.0	66.0	0.8	5.5	1.5	0.34
	76.200	18.009	17.384	14.288	1.5	1.5	44.5	55.1	5,200	6,900	**11162—11300**	0.8	0.49	1.23	0.68	46.5	49.0	1.5	71.0	67.0	1.5	3.5	3.0	0.33
	76.200	22.225	23.020	17.462	3.5	0.8	69.9	89.2	5,200	6,900	**24780—24720**	4.8	0.39	1.53	0.84	47.0	54.0	3.5	72.0	68.0	0.8	5.5	3.5	0.41
	80.000	21.000	22.403	17.826	0.8	1.3	73.6	83.4	4,900	6,600	**336—332**	6.2	0.27	2.20	1.21	46.0	47.0	0.8	75.0	73.0	1.3	5.0	4.5	0.46
	80.000	21.000	22.403	17.826	3.5	1.3	73.6	83.4	4,900	6,600	**342—332**	6.2	0.27	2.20	1.21	46.0	53.0	3.5	75.0	73.0	1.3	5.0	4.5	0.45
	82.550	26.543	25.654	20.193	3.5	3.3	84.9	112	4,900	6,500	**M802048—M802011**	3.0	0.55	1.10	0.60	51.0	57.0	3.5	79.0	70.0	3.3	5.5	3.0	0.62
	85.725	30.162	30.162	23.812	3.5	1.3	115	148	4,800	6,400	**3877—3821**	8.1	0.40	1.49	0.82	50.0	57.0	3.5	81.0	75.0	1.3	7.0	4.5	0.83
	87.312	30.162	30.886	23.812	0.8	3.3	105	134	4,800	6,400	**3576—3525**	10.2	0.31	1.96	1.08	48.0	49.0	0.8	81.0	75.0	3.3	6.5	3.5	0.82

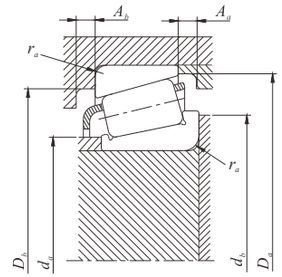
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 41.275~44.450 mm

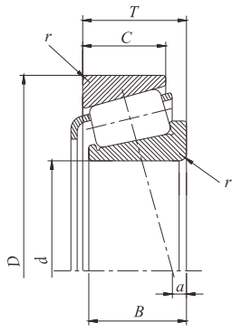
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	$a^{1)}$	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
41.275	88.501	26.988	29.083	22.225	3.5	1.5	107	124	4,600	6,200	**419—414**	9.7	0.26	2.28	1.25	47.0	54.0	3.5	80.0	77.0	1.5	6.0	5.0	0.77
	88.900	20.638	22.225	16.513	3.5	1.3	79.5	95.8	4,900	6,500	**365A—362A**	4.3	0.32	1.88	1.03	48.5	55.0	3.5	84.0	81.0	1.3	5.5	5.0	0.62
	88.900	30.162	29.370	23.020	3.5	3.3	105	144	4,400	5,800	**HM803146—HM803110**	4.3	0.55	1.10	0.60	53.0	60.0	3.5	85.0	74.0	3.3	7.5	4.0	0.89
	88.900	30.162	29.370	23.020	3.5	0.8	105	144	4,600	6,100	**HM803146—HM803111**	4.3	0.55	1.10	0.60	53.0	60.0	3.5	85.0	76.0	0.8	7.5	4.0	0.90
	90.488	39.688	40.386	33.338	3.5	3.3	155	204	4,500	6,000	**4388—4335**	15.0	0.28	2.11	1.16	51.0	57.0	3.5	85.0	77.0	3.3	6.5	3.5	1.23
	93.662	31.750	31.750	26.195	0.8	3.3	120	158	4,400	5,800	**46162—46368**	7.9	0.40	1.49	0.82	51.0	52.0	0.8	87.0	79.0	3.3	5.5	3.5	1.07
	95.250	30.162	29.370	23.020	3.5	3.3	115	157	3,300	4,400	**HM804840—HM804810**	3.8	0.55	1.10	0.60	54.0	61.0	3.5	91.0	81.0	3.3	7.0	4.5	1.06
	104.775	36.513	36.512	28.575	1.5	3.3	159	223	3,800	5,100	**HM807035—HM807010**	7.4	0.49	1.23	0.68	57.0	60.0	1.5	100	89.0	3.3	7.0	4.0	1.69
42.070	90.488	39.688	40.386	33.338	3.5	3.3	155	204	4,500	6,000	**4395—4335**	15.0	0.28	2.11	1.16	51.0	58.0	3.5	85.0	77.0	3.3	6.5	3.5	1.21
42.862	76.992	17.462	17.145	11.908	1.5	1.5	45.9	58.1	5,000	6,600	**12168—12303**	0	0.51	1.19	0.65	48.5	51.0	1.5	73.0	68.0	1.5	6.0	3.5	0.31
42.875	79.375	23.812	25.400	19.050	3.5	0.8	84.3	110	5,000	6,700	**26884—26822**	7.4	0.32	1.88	1.04	48.5	55.0	3.5	74.0	71.0	0.8	5.0	4.5	0.50
	82.931	23.876	25.400	19.050	3.5	0.8	83.8	111	4,800	6,300	**25577—25520**	6.4	0.33	1.79	0.99	49.0	55.0	3.5	77.0	74.0	0.8	5.5	4.5	0.58
44.450	73.025	18.258	18.258	15.083	1.5	1.5	52.8	73.8	5,100	6,800	**L102849—L102810**	3.8	0.32	1.88	1.04	49.0	51.0	1.5	69.0	66.0	1.5	4.5	3.0	0.30
	79.992	17.462	17.145	11.908	1.5	1.5	45.9	58.1	5,000	6,600	**12175—12303**	0	0.51	1.19	0.65	49.5	52.0	1.5	73.0	68.0	1.5	6.0	3.5	0.30
	79.375	17.462	17.462	13.495	2.8	1.5	48.2	61.3	4,800	6,400	**18685—18620**	2	0.37	1.60	0.88	49.5	54.0	2.8	74.0	71.0	1.5	5.0	3.5	0.34
	82.931	23.812	25.400	19.050	5.0	0.8	83.8	111	4,800	6,300	**25582—25520**	6.4	0.33	1.79	0.99	50.0	60.0	5.0	77.0	74.0	0.8	5.5	4.5	0.55
	84.138	30.162	30.886	23.812	3.5	3.3	105	134	4,600	6,200	**3578—3520**	10.2	0.31	1.96	1.08	51.0	57.0	3.5	80.0	74.0	3.3	6.5	3.5	0.68
	85.000	20.638	21.692	17.462	2.3	1.3	75.8	89.2	4,600	6,200	**355—354A**	4.8	0.31	1.96	1.08	50.0	54.0	2.3	80.0	77.0	1.3	5.0	5.0	0.50
	85.000	20.638	21.692	17.462	0.8	1.3	75.8	89.2	4,600	6,200	**355A—355A**	4.8	0.31	1.96	1.08	50.0	51.0	0.8	80.0	77.0	1.3	5.0	5.0	0.50
	88.900	30.162	29.370	23.020	3.5	3.3	105	144	4,600	6,100	**HM803149—HM803110**	4.3	0.55	1.10	0.60	53.4	62.0	3.5	85.0	74.0	3.3	7.5	4.0	0.84
	93.662	31.750	31.750	26.195	0.8	3.3	120	158	4,400	5,900	**46175—46368**	7.8	0.40	1.49	0.92	54.0	55.0	0.8	87.0	79.0	3.3	5.5	3.5	1.01
	93.662	31.750	31.750	25.400	3.5	3.3	126	156	4,400	5,800	**49175—49368**	9.1	0.36	1.67	0.82	53.0	59.0	3.5	87.0	82.0	3.3	5.5	3.0	1.00
	93.662	31.750	31.750	26.195	3.5	3.3	120	158	4,400	5,800	**46176—46368**	7.8	0.40	1.49	0.82	54.0	60.0	3.5	87.0	79.0	3.3	5.5	3.5	1.01
	95.250	27.783	28.575	22.225	0.8	2.3	120	161	4,100	5,400	**33885—33821**	7.6	0.33	1.82	1.00	53.0	53.0	0.8	90.0	85.0	2.3	6.5	5.5	0.96
	95.250	27.783	29.000	22.225	3.5	0.8	118	144	4,500	5,900	**438—432A**	9.1	0.28	2.11	1.16	51.0	57.0	3.5	87.0	84.0	0.8	6.0	5.0	0.93
	95.250	30.162	29.370	23.020	0.8	3.3	115	157	3,300	4,400	**HM804842—HM804810**	3.8	0.55	1.10	0.6	57.0	57.0	0.8	91.0	81.0	3.3	7.0	4.5	1.02
	95.250	30.162	29.370	23.020	3.5	3.3	115	157	3,700	5,200	**HM804843—HM804810**	3.8	0.55	1.10	0.6	57.0	63.0	3.5	91.0	81.0	3.3	7.0	4.5	1.01

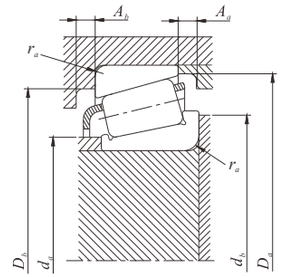
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 44.450~47.625 mm

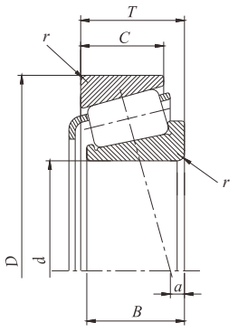
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{or}	Grease	Oil	Inner ring—Outer ring	$a^{1)}$	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
44.450	95.250	30.958	28.300	20.638	3.5	0.8	92.8	104	3,700	5,200	53177—53375	0.3	0.74	0.81	0.45	53.0	63.0	3.5	89.0	81.0	0.8	7.0	2.0	0.94
	95.250	30.958	28.300	20.638	2.0	0.8	92.8	104	3,700	5,200	53178—53375	0.3	0.74	0.81	0.45	53.0	60.0	2.0	89.0	81.0	0.8	7.0	2.0	0.94
	95.250	30.958	28.575	22.225	3.5	0.8	107	132	3,700	5,100	HM903249—HM903210	-0.5	0.74	0.81	0.45	54.0	65.0	3.5	91.0	81.0	0.8	7.0	2.0	1.00
	98.425	31.750	31.750	25.400	0.8	3.3	123	155	3,900	5,200	49576—49520	7.1	0.40	1.50	0.82	54.0	55.0	0.8	96.0	88.0	3.3	6.5	4.0	1.23
	98.425	30.958	28.300	20.638	1.3	0.8	92.8	104	3,700	5,200	53176—53387	0.3	0.74	0.81	0.45	53.0	59.0	1.3	91.0	82.0	0.8	7.0	2.0	1.03
	101.6	34.926	30.068	26.988	3.5	3.3	152	192	4,000	5,300	527—522	12.7	0.29	2.10	1.16	53.0	59.0	3.5	95.0	89.0	3.3	8.0	5.5	1.35
	104.775	36.512	36.512	28.575	3.5	3.3	159	223	3,800	5,100	HM807040—HM807010	7.4	0.49	1.23	0.68	59.0	66.0	3.5	100	89.0	3.3	7.0	4.0	1.62
	111.125	30.162	26.909	20.638	3.5	3.3	118	161	3,100	4,300	55175C—55437	-7.6	0.88	0.68	0.37	64.0	70.0	3.5	105	92.0	3.3	6.0	3.5	1.44
	111.125	30.162	26.909	20.638	0.8	3.3	118	161	3,100	4,300	55176C—55437	-7.6	0.88	0.68	0.37	64.0	65.0	0.8	105	92.0	3.3	6.0	3.5	1.44
	111.125	38.100	36.957	30.162	3.5	3.3	159	206	3,800	5,100	535—532A	12.2	0.3	2.02	1.11	54.0	60.0	3.5	100	95.0	3.3	8.0	2.5	1.84
44.983	93.264	30.162	30.302	23.812	3.5	3.3	113	153	4,200	5,500	3776—3720	8.1	0.34	1.77	0.97	53.0	59.0	3.5	88.0	82.0	3.3	7.0	3.5	0.94
44.988	95.250	30.958	28.575	22.225	3.5	0.8	107	132	3,700	5,100	HM903248—HM903210	-0.5	0.74	0.81	0.45	54.0	66.0	3.5	91.0	81.0	0.8	7.0	2.0	0.99
45.000	85.000	20.638	21.692	17.462	1.5	1.3	75.8	89.2	4,600	6,200	358—354A	4.8	0.31	1.96	1.08	50.0	53.0	1.5	80.0	77.0	1.3	5.0	5.0	0.50
45.242	73.431	19.558	19.812	15.748	3.5	0.8	56.9	81.8	5,100	6,700	LM102949—LM102910	4.6	0.31	1.97	1.08	50.0	56.0	3.5	70.0	68.0	0.8	4.5	3.0	0.31
	77.788	19.842	19.842	15.080	3.5	0.8	59.6	77.9	4,900	6,500	LM603049—LM603011	2.3	0.43	1.41	0.77	50.0	57.0	3.5	74.0	71.0	0.8	5.0	3.5	0.36
	77.788	21.430	19.842	16.667	3.5	0.8	59.6	77.9	4,900	6,500	LM603049—LM603012	2.3	0.43	1.41	1.08	50.0	57.0	3.5	74.0	70.0	0.8	5.0	2.0	0.37
	80.000	19.842	19.842	15.080	3.5	0.8	59.6	77.9	4,900	6,500	LM603049—LM603014	2.3	0.43	1.41	0.77	51.0	58.0	3.5	75.0	71.0	0.8	5.0	3.5	0.39
45.618	85.000	23.812	25.400	19.050	3.5	2.3	83.8	111	4,800	6,300	25590—25526	6.4	0.33	1.79	0.99	51.0	58.0	3.5	78.0	74.0	2.3	5.5	4.5	0.57
45.987	74.976	18.000	18.000	14.000	2.3	1.5	52.6	75.4	5,000	6,600	LM503349—LM503310	2.0	0.40	1.49	0.82	51.0	55.0	2.3	71.0	67.0	1.5	5.0	3.5	0.30
46.038	79.375	17.462	17.462	13.495	2.8	1.5	48.2	61.3	4,800	6,400	18690—18620	2.0	0.37	1.60	0.88	51.0	56.0	2.8	74.0	71.0	1.5	5.0	3.5	0.33
	85.000	20.638	21.692	17.462	3.5	1.3	75.8	89.2	4,800	6,200	359A—354A	4.8	0.31	1.96	1.08	51.0	57.0	3.5	80.0	77.0	1.3	5.0	5.0	0.48
	85.000	20.638	21.692	17.462	2.3	1.3	75.8	89.2	4,800	6,200	359S—354A	4.8	0.31	1.96	1.08	51.0	55.0	2.3	80.0	77.0	1.3	5.0	5.0	0.48
	85.000	25.400	25.608	20.638	3.5	1.3	86.4	117	4,800	6,100	2984—2924	6.4	0.35	1.73	0.95	52.0	58.0	3.5	80.0	76.0	1.3	5.0	5.0	0.60
47.625	88.900	20.638	22.225	16.513	3.5	1.3	79.5	95.8	4,400	5,800	369A—362A	4.3	0.32	1.88	1.03	53.0	60.0	3.5	84.0	81.0	1.3	5.0	5.0	0.54
	88.900	25.400	25.400	19.050	3.5	3.3	91.3	116	4,400	5,900	M804049—M804010	1.8	0.55	1.10	0.6	56.0	63.0	3.5	85.0	77.0	3.3	6.5	4.5	0.65

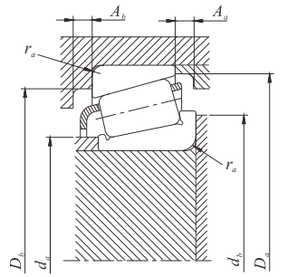
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 47.625~50.800 mm

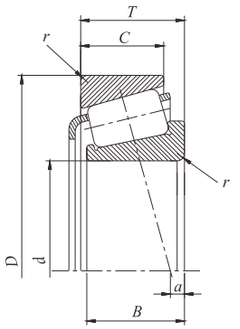
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{or}	Grease	Oil	Inner ring—Outer ring	$a^{1)}$	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
47.625	95.250	30.162	29.370	23.020	3.5	3.3	115	157	3,300	4,400	HM804046—HM804810	3.8	0.55	1.10	0.6	57.0	66.0	3.5	91.0	81.0	3.3	7.0	4.5	0.96
	96.838	21.000	21.946	15.875	0.8	0.8	84.2	108	3,900	5,200	386A—382A	3.0	0.35	1.69	0.93	55.0	56.0	0.8	92.0	89.0	0.8	6.0	5.5	0.72
	101.600	34.925	36.068	26.988	3.5	3.3	152	192	4,000	5,300	528—522	12.7	0.29	2.10	1.16	55.0	62.0	3.5	95.0	89.0	3.3	8.0	5.5	1.29
	104.775	30.162	29.317	24.605	4.8	3.3	126	166	3,700	4,900	463—453X	7.1	0.34	1.79	0.98	56.0	65.0	4.8	98.0	92.0	3.3	5.5	3.0	1.21
	104.775	30.162	29.317	24.605	0.8	3.3	126	166	3,700	4,900	467—453X	7.1	0.34	1.79	0.98	56.0	57.0	0.8	98.0	92.0	3.3	5.5	3.0	1.22
	104.775	30.162	30.958	23.812	3.5	3.3	142	189	3,700	4,900	45282—45220	8.1	0.33	1.8	0.99	57.0	63.0	3.5	99.0	93.0	3.3	6.5	5.0	1.26
	111.125	30.162	26.909	20.638	3.5	3.3	118	161	3,200	4,400	55187C—55437	-7.6	0.88	0.68	0.37	62.0	69.0	3.5	105.0	92.0	3.3	6.0	3.5	1.39
	112.712	30.162	26.909	20.638	3.5	3.3	118	161	3,100	4,300	55187C—55443	-7.6	0.88	0.68	0.37	62.0	69.0	3.5	106.0	92.0	3.3	6.0	3.5	1.47
48.412	95.250	30.162	29.370	23.020	2.3	3.3	115	157	3,300	4,400	HM804848—HM804810	3.8	0.55	1.10	0.6	57.0	63.0	2.3	91.0	81.0	3.3	7.0	4.5	0.95
	95.250	30.162	29.370	23.020	3.5	3.3	115	157	3,300	4,400	HM804849—HM804810	3.8	0.55	1.10	0.6	57.0	63.0	3.5	91.0	83.0	3.3	7.0	4.5	0.95
49.212	88.900	20.638	22.225	16.513	0.8	1.3	79.5	95.8	4,400	5,800	365S—362A	4.3	0.32	1.88	1.03	54.0	55.0	0.8	84.0	81.0	1.3	5.5	5.0	0.53
	104.775	36.512	36.512	28.575	3.5	3.3	159	223	3,800	5,100	HM807044—HM807010	7.4	0.49	1.23	0.68	63.0	69.0	3.5	100.0	89.0	3.3	7.0	4.0	1.52
	114.3	44.500	44.500	34.925	3.5	3.3	207	256	3,800	5,000	65390—65320	12.4	0.43	1.39	0.77	60.0	70.0	3.5	107.0	97.0	3.3	9.0	4.0	2.18
	114.3	44.500	44.500	36.068	3.5	3.3	228	290	3,700	5,000	HH506348—HH506310	13.5	0.40	1.49	0.82	61.0	71.0	3.5	107.0	97.0	3.3	9.5	6.0	2.34
49.987	92.075	24.608	25.400	19.845	2.3	0.8	91.6	130	4,200	5,600	28579—28521	4.8	0.38	1.59	0.87	56.0	60.0	2.3	87.0	83.0	0.8	5.0	3.5	0.71
50.000	82.000	21.500	21.500	17.000	3.0	0.5	75.2	104	4,500	6,000	JLM104948—JLM104910	5.3	0.31	1.97	1.08	55.0	60.0	3.0	78.0	76.0	0.5	5.5	4.0	0.41
	88.900	20.638	22.225	16.513	2.0	1.3	79.5	95.8	4,400	5,800	365—362A	4.3	0.32	1.88	1.03	55.0	58.0	2.0	84.0	81.0	1.3	5.5	5.0	0.51
	88.900	20.638	22.225	16.513	2.3	1.3	79.5	95.8	4,400	5,800	366—362A	4.3	0.32	1.88	1.03	55.0	59.0	2.3	84.0	81.0	1.3	5.5	5.0	0.51
	90.000	28.000	28.000	23.000	3.0	2.5	115	154	4,300	5,800	JM205149—JM205110	7.6	0.33	1.82	1.00	57.0	62.0	3.0	85.0	80.0	2.5	6.5	4.5	0.74
	105.000	37.000	36.000	29.000	3.0	2.5	159	223	3,800	5,100	JHM807045—JHM807012	7.4	0.49	1.23	0.68	63.0	69.0	3.0	100.0	90.0	2.5	6.5	4.0	1.52
	110.000	22.000	21.996	18.824	0.8	1.3	91.6	126	3,400	4,500	396—394A	0.8	0.40	1.49	0.82	60.0	61.0	0.8	104.0	101.0	1.3	4.0	4.5	1.04
50.800	80.962	18.258	18.258	14.288	1.5	1.5	56.3	88.8	4,600	6,100	L305649—L305610	2.5	0.36	1.69	0.93	56.0	58.0	1.5	77.0	73.0	1.5	5.0	3..5	0.34
	82.55	21.590	22.225	16.510	3.5	1.3	75.2	104	4,500	6,000	LM104949—LM104911	5.8	0.31	1.97	1.08	55.0	62.0	3.5	78.0	75.0	1.3	5.5	4.5	0.42
	85.725	19.050	18.263	12.700	1.5	1.5	47.8	63.9	4,400	5,900	18200—18337	-1.9	0.57	1.06	0.58	56.0	59.0	1.5	81.0	76.0	1.5	5.0	3.0	0.39
	88.900	17.462	17.462	13.495	3.5	1.3	50.6	67.5	4,400	5,900	18790—18724	0.8	0.41	1.48	0.81	56.0	62.0	3.5	82.0	78.0	1.3	5.0	3.5	0.42
	88.900	20.638	22.225	16.153	1.5	1.3	79.5	95.8	4,400	5,900	368—362A	4.3	0.32	1.88	1.03	56.0	58.0	1.5	84.0	81.0	1.3	5.5	5.0	0.50
	88.900	20.638	22.225	16.153	3.5	1.3	79.5	95.8	4,400	5,800	368A—362A	4.3	0.32	1.88	1.03	56.0	62.0	3.5	84.0	81.0	1.3	5.5	5.0	0.50

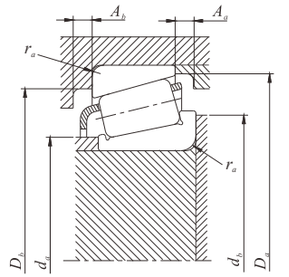
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 50.800~53.975 mm

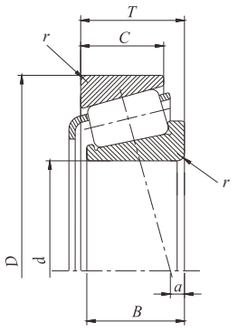
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	a[1]	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
50.800	88.900	20.638	22.225	16.513	5.0	1.3	79.5	95.8	4,400	5,800	370A—362A	4.3	0.32	1.88	1.03	56.0	65.0	5.0	84.0	81.0	1.3	5.5	5.0	0.49
	92.075	24.608	25.400	19.845	3.5	0.8	91.6	130	4,200	5,600	28580—28521	4.8	0.38	1.59	0.87	57.0	63.0	3.5	87.0	83.0	0.8	5.0	3.5	0.69
	93.264	20.638	22.225	15.083	2.3	1.3	81.4	101	4,200	5,600	375—374	3.8	0.34	1.77	0.97	57.0	60.0	2.3	88.0	85.0	1.3	7.0	5.5	0.59
	93.264	30.162	30.302	23.812	3.5	3.3	113	153	4,200	5,500	3780—3720	8.1	0.34	1.77	0.97	58.0	64.0	3.5	88.0	82.0	3.3	7.0	3.5	0.84
	93.264	30.162	30.302	23.812	3.5	0.8	113	153	4,200	5,500	3780—3730	8.1	0.34	1.77	0.97	58.0	64.0	3.5	88.0	84.1	0.8	7.0	3.5	0.85
	95.250	27.783	28.575	22.225	3.5	2.3	120	161	4,100	5,400	33889—33822	7.6	0.33	1.82	1.00	58.0	64.0	3.5	90.0	85.0	2.3	6.5	5.5	0.85
	96.838	21.000	21.946	15.875	2.3	0.8	84.2	108	3,900	5,200	385—382A	3.0	0.35	1.69	0.93	60.0	61.0	2.3	92.0	89.0	0.8	6.0	5.5	0.67
	97.630	24.608	24.608	19.446	3.5	0.8	96.3	142	3,900	5,200	28678—28622	3.3	0.40	1.49	0.82	58.0	65.0	3.5	92.0	88.0	0.8	5.0	4.0	0.83
	98.425	30.162	30.302	23.812	3.5	3.3	113	153	4,200	5,500	3870—3732	8.1	0.34	1.77	0.97	58.0	64.0	3.5	90.0	84.0	3.3	7.0	3.5	0.98
	101.600	31.750	31.750	25.400	3.5	3.3	123	155	3,900	5,200	49585—49520	7.1	0.40	1.50	0.82	59.0	66.0	3.5	96.0	88.0	3.3	6.5	4.0	1.11
	101.600	34.925	36.068	26.998	0.8	3.3	152	192	4,000	5,300	529—522	12.7	0.29	2.10	1.16	58.0	59.0	0.8	95.0	89.0	3.3	8.0	5.5	1.23
	101.600	34.925	36.068	26.998	3.5	3.3	152	192	4,000	5,300	529X—522	12.7	0.29	2.10	1.16	58.0	65.0	3.5	95.0	89.0	3.3	8.0	5.5	1.22
	104.775	30.162	30.958	23.812	6.4	3.3	142	189	3,700	4,900	45284—25220	8.1	0.33	1.80	0.99	59.0	71.0	6.4	99.0	93.0	3.3	6.5	5.0	1.19
	104.775	36.512	36.512	28.575	3.5	3.3	159	223	3,900	5,100	HM807046—HM807010	7.4	0.49	1.23	0.68	63.0	70.0	3.5	100.0	89.0	3.3	7.0	4.0	1.49
	104.775	36.512	36.512	28.575	3.5	3.3	158	202	3,800	5,100	59200—59412	9.7	0.40	1.49	0.82	61.0	68.0	3.5	99.0	92.0	3.3	7.0	4.0	1.39
	104.775	39.688	40.157	33.338	3.5	3.3	167	237	3,800	5,100	4580—4535	12.4	0.34	1.79	0.98	61.0	67.0	3.5	99.0	90.0	3.3	7.5	4.5	1.61
51.592	88.900	20.638	22.225	16.513	2.0	1.3	79.5	95.8	4,400	5,800	368S—362A	4.3	0.32	1.88	1.03	56.0	59.0	2.0	84.0	81.0	1.3	5.5	5.0	0.49
52.388	92.075	24.608	25.400	19.845	3.5	0.8	91.6	130	4,200	5,600	28584—28521	4.8	0.38	1.59	0.87	58.0	65.0	3.5	87.0	83.0	0.8	5.0	3.5	0.66
	104.775	30.162	29.317	24.605	1.5	3.3	126	166	3,700	4,900	468—453X	7.1	0.34	1.79	0.98	60.0	62.0	1.5	98.0	92.0	3.3	5.5	3.0	1.12
53.975	88.900	19.050	19.050	13.492	2.3	2.0	60.6	81.8	4,200	5,600	LM806649—LM806610	-2.3	0.55	1.10	0.68	60.0	63.0	2.3	85.0	80.0	2.0	5.5	4.0	0.42
	95.250	27.783	28.575	22.225	1.5	0.8	120	161	4,100	5,400	33895—33822	7.6	0.33	1.82	1.00	60.0	63.0	1.5	90.0	86.0	0.8	6.5	5.5	0.79
	104.775	30.162	29.317	24.605	3.5	3.3	126	166	3,700	4,900	456—453X	7.1	0.34	1.79	0.98	61.0	68.0	3.5	98.0	92.0	3.3	5.5	3.0	1.1
	104.775	36.512	36.512	28.575	3.5	3.3	159	223	3,800	5,100	HM807049—HM807010	7.4	0.49	1.23	0.68	63.0	73.0	3.5	100.0	89.0	3.3	7.0	4.0	1.41
	104.775	39.688	40.157	33.338	3.5	3.3	167	237	3,800	5,100	4595—4535	12.3	0.34	1.79	0.98	63.0	70.0	3.5	99.0	90.0	3.3	7.5	4.5	1.54
	107.950	36.512	36.957	28.575	3.5	3.3	159	206	3,800	5,100	539—532X	12.2	0.30	2.02	1.11	61.0	68.0	3.5	100.0	94.0	3.3	8.0	4.0	1.44
	107.950	36.512	36.957	28.575	5.5	3.3	159	161	3,800	5,100	539A—532X	12.2	0.30	2.02	1.11	61.0	72.0	5.5	100.0	94.0	3.3	8.0	4.0	1.43
	117.475	33.338	31.750	23.812	3.5	3.3	138	166	3,500	4,600	66212—66462	0.3	0.63	0.96	0.53	67.0	73.0	3.5	110.0	100.0	3.3	7.0	3.0	1.58
	120.650	41.275	41.275	31.750	3.5	3.3	192	244	3,500	4,600	621—612	14.0	0.31	1.91	1.05	63.0	70.0	3.5	110.0	105.0	3.3	8.5	5.0	2.18

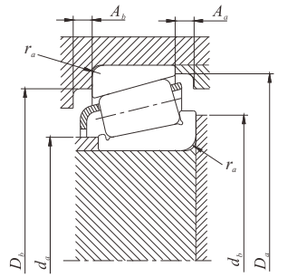
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 53.975~57.150 mm

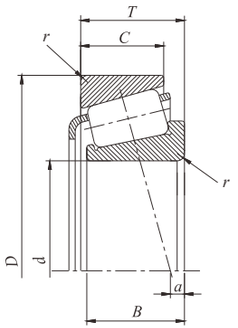
Boundary dimensions (mm) d	D	T	B	C	r(Min) Inner ring	r(Min) Outer ring	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Grease	Oil	Nominal numbers Inner ring—Outer ring	Application point position mm $a^{1)}$	Constant e	Axial load coefficient Y_1	Y_0	Mounting dimensions (mm) Shaft d_a	d_b	r_a(Max)	Housing D_a	D_b	r_a(Max)	Cage A_a	A_b	Reference mass (kg)
53.975	122.238	33.338	31.750	23.812	3.5	3.3	143	178	3,300	4,300	66584—66520	-2.0	0.67	0.90	0.5	68.0	75.0	3.5	116.0	105.0	3.3	7.0	3.0	1.78
	122.238	43.658	43.764	36.512	3.5	3.3	219	327	3,200	4,300	5578—5535	12.2	0.36	1.67	0.92	67.0	73.0	3.5	116.0	106.0	3.3	7.5	4.0	2.59
	123.825	36.512	32.791	25.400	3.5	3.3	167	208	2,900	4,000	72212C—72487	-2.0	0.74	0.81	0.45	67.0	79.0	3.5	116.0	102.0	3.3	8.0	3.5	2.12
	123.825	38.100	36.678	30.162	3.5	3.3	177	248	3,200	4,200	557S—552A	9.4	0.35	1.73	0.95	65.0	71.0	3.5	116.0	109.0	3.3	7.5	2.5	2.22
	127.000	44.450	44.450	34.925	3.5	3.3	225	297	3,300	4,400	65212—65500	9.4	0.49	1.23	0.68	71.0	77.0	3.5	119.0	107.0	3.3	8.5	4.0	2.86
	130.175	36.512	33.338	23.812	3.5	3.3	154	183	2,600	3,700	HM911242—HM911210	-5.3	0.82	0.73	0.40	74.0	79.0	3.5	123.6	109.0	3.3	8.5	4.0	2.22
54.988	104.775	30.162	29.317	24.605	2.3	3.3	126	166	3,700	4,900	466—453X	7.1	0.34	1.79	0.98	62.0	66.0	2.3	98.0	92.0	3.3	5.5	3.0	1.08
54.991	135.755	53.975	56.007	44.450	3.5	3.3	298	404	3,000	4,000	6381—6320	19.3	0.32	1.85	1.02	70.0	76.0	3.5	126.0	117.0	3.3	9.0	6.0	4.03
55.000	90.000	23.000	23.000	18.500	1.5	0.5	85.0	123	4,200	5,500	JLM506849—JLM506810	2.8	0.40	1.49	0.82	61.0	63.0	1.5	86.0	82.0	0.5	5.0	3.5	0.55
	95.000	29.000	29.000	23.500	1.5	2.5	121	168	4,000	5,300	JM207049—JM207010	7.6	0.33	1.79	0.98	62.0	64.0	1.5	91.0	85.0	2.5	6.5	4.5	0.84
	96.838	21.000	21.946	15.875	2.3	0.8	84.2	108	3,900	5,200	385—382A	3.0	0.35	1.69	0.93	61.0	65.0	2.3	92.0	89.0	0.8	6.0	5.5	0.61
	96.838	21.000	21.946	15.875	3.5	0.8	84.2	108	3,900	5,200	385X—382A	3.0	0.35	1.69	0.93	61.0	67.0	3.5	92.0	89.0	0.8	6.0	5.5	0.61
	110.000	39.000	39.000	32.000	3.0	2.5	194	251	3,600	4,900	JH307749—JH307710	11.7	0.35	1.73	0.95	64.0	71.0	3.0	104.0	97.0	2.5	9.0	6.0	1.69
55.562	97.630	24.608	24.608	19.446	3.5	0.8	96.3	142	3,900	5,200	28680—28622	3.4	0.40	1.49	0.82	62.0	68.0	3.5	92.0	88.0	0.8	5.0	4.0	0.75
	127.000	36.512	36.512	26.988	3.5	3.3	179	256	3,000	4,000	HM813840—HM813810	3.8	0.50	1.20	0.68	70.0	76.0	3.5	121.0	111.0	3.3	8.0	4.0	2.73
55.575	96.838	21.000	21.946	15.875	2.3	0.8	84.2	108	3,900	5,200	389—382A	3.0	0.35	1.69	0.93	61.0	65.0	2.3	92.0	89.0	0.8	6.0	5.5	0.60
57.150	96.838	21.000	21.946	15.875	2.3	0.8	84.2	108	3,900	5,200	387—382A	3.0	0.35	1.69	0.93	62.0	66.0	2.3	92.0	89.0	0.8	6.0	5.5	0.58
	96.838	21.000	21.946	15.875	3.5	0.8	84.2	108	3,900	5,200	387A—382A	3.0	0.35	1.69	0.93	62.0	69.0	3.5	92.0	89.0	0.8	6.0	5.5	0.57
	96.838	21.000	21.946	15.875	5.0	0.8	84.2	108	3,900	5,200	387AS—382A	3.0	0.35	1.69	0.93	62.0	72.0	5.0	92.0	89.0	0.8	6.0	5.5	0.56
	96.838	21.000	21.946	15.875	0.8	0.8	84.2	108	3,900	5,200	387S—382A	3.0	0.35	1.69	0.93	62.0	63.0	0.8	92.0	89.0	0.8	6.0	5.5	0.58
	98.425	21.000	21.946	17.826	3.5	0.8	84.2	108	3,900	5,200	387A—382	3.0	0.35	1.69	0.93	62.0	69.0	3.5	92.0	90.0	0.8	4.0	4.5	0.62
	104.775	30.162	29.317	24.605	2.3	3.3	126	166	3,700	4,900	462—453X	7.1	0.34	1.79	0.98	63.0	67.0	2.3	98.0	92.0	3.3	5.5	3.0	1.04
	104.775	30.162	29.317	24.605	3.5	3.3	126	166	3,700	4,900	469—453X	7.1	0.34	1.79	0.98	63.0	70.0	3.5	98.0	92.0	3.3	5.5	3.0	1.03
	104.775	30.162	30.958	23.812	6.4	0.8	142	189	3,700	4,900	45291—45221	8.1	0.33	1.80	0.99	65.0	76.0	6.4	99.0	95.0	0.8	6.5	5.0	1.06
	112.712	30.162	30.048	23.812	3.5	3.3	129	191	3,400	4,500	3979—3920	4.6	0.40	1.49	0.82	66.0	72.0	3.5	106.0	99.0	3.3	6.5	3.5	1.36
	112.712	30.162	30.162	23.812	3.5	3.3	155	224	3,300	4,500	39580—39520	6.6	0.34	1.77	0.97	66.0	72.0	3.5	107.0	101.0	3.3	7.0	5.0	1.37

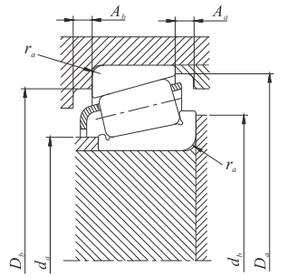
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 57.150~63.500 mm

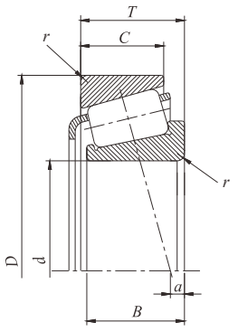
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	a[1]	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
57.150	112.712	30.162	30.162	23.812	8.0	3.3	155	224	3,300	4,500	39581—39520	6.6	0.34	1.77	0.97	66.0	81.0	8.0	107.0	101.0	3.3	7.0	5.0	1.33
	117.475	30.162	30.162	23.812	3.5	3.3	128	197	3,200	4,200	33225—33462	2.8	0.44	1.38	0.76	68.0	74.0	3.5	112.0	104.0	3.3	6.5	3.5	1.53
	120.650	41.275	41.275	31.750	3.5	3.3	192	244	3,500	4,600	623—612	14.0	0.31	1.91	1.05	66.0	72.0	3.5	110.0	105.0	3.3	8.5	5.0	2.09
	123.825	36.512	32.791	25.400	3.5	3.3	167	208	2,900	4,000	72225C—72487	-2.0	0.74	0.81	0.45	67.0	81.0	3.5	116.0	102.0	3.3	8.0	3.5	2.05
	127.000	44.450	44.450	34.925	3.5	3.3	225	297	3,300	4,400	65225—65500	9.4	0.49	1.23	0.68	71.0	80.0	3.5	119.0	107.0	3.3	8.5	4.0	2.68
	140.030	36.512	33.236	23.520	3.5	2.3	158	193	2,500	3,500	78225—78551	-7.9	0.87	0.69	0.38	77.0	83.0	3.5	132.0	117.0	2.3	9.0	4.0	2.56
57.531	96.838	21.000	21.946	15.875	3.5	0.8	84.2	108	3,900	5,200	388A—382A	3.0	0.35	1.69	0.93	63.0	69.0	3.5	92.0	89.0	0.8	6.0	5.5	0.57
59.972	122.238	33.338	31.750	23.812	0.8	3.3	143	178	3,300	4,300	66589—66520	-2.0	0.67	0.90	0.50	73.0	74.0	0.8	116.0	105.0	3.3	7.0	3.0	1.65
60.000	95.000	24.000	24.000	19.000	5.0	2.5	90.4	135	3,900	5,200	JLM508748—JLM508710	2.8	0.40	1.49	0.82	66.0	75.0	5.0	91.0	85.0	2.5	5.5	3.5	0.63
	107.950	25.400	25.400	19.050	3.5	3.3	102	158	3,300	4,400	29580—29520	0.8	0.46	1.31	0.72	68.0	75.0	3.5	103.0	96.0	3.3	6.0	3.0	0.84
	110.000	22.000	21.996	18.824	0.8	1.3	91.6	126	2,500	3,500	397—394A	0.8	0.4	1.49	0.82	68.0	69.0	0.8	104.0	101.0	1.3	4.0	4.5	0.89
60.325	100.000	25.400	25.400	19.845	3.5	3.3	98.2	149	3,700	4,900	28985—28921	2.5	0.43	1.41	0.78	67.0	73.0	3.5	96.00	89.00	3.3	5.5	3.0	0.75
	101.600	25.400	25.400	19.845	3.5	3.3	98.2	149	3,700	4,900	28985—28920	2.5	0.43	1.41	0.78	67.0	73.0	3.5	97.00	90.00	3.3	5.5	3.0	0.79
	122.238	43.658	43.764	36.512	3.5	3.3	219	327	3,200	4,300	5583—5535	12.2	0.36	1.67	0.92	72.0	78.0	3.5	116.0	106.0	3.3	7.5	4.0	2.40
	127.000	36.512	36.512	26.988	3.5	3.3	179	256	3,000	4,000	HM813841—HM813810	3.8	0.50	1.20	0.66	73.0	80.0	3.5	121.0	111.0	3.3	8.0	4.0	2.61
	127.000	36.512	36.512	26.988	1.5	3.3	179	256	3,000	4,000	HM813841A—HM813810	3.8	0.50	1.20	0.66	73.0	76.0	1.5	121.0	111.0	3.3	8.0	4.0	2.61
	127.000	44.450	44.450	34.925	3.5	3.3	225	297	3,300	4,400	65237—65500	9.4	0.49	1.23	0.68	71.0	82.0	3.5	119.0	107.0	3.3	8.5	4.0	2.66
	127.000	44.450	44.450	34.925	1.5	3.3	225	297	3,300	4,400	65237A—65500	9.4	0.49	1.23	0.68	71.0	78.0	1.5	119.0	107.0	3.3	8.5	4.0	2.59
	130.175	36.512	33.338	23.812	5.0	3.3	154	183	2,600	3,700	HM911245—HM911210	-5.3	0.82	0.73	0.40	74.0	87.0	5.0	124.0	109.0	3.3	8.5	4.0	2.06
	136.525	46.038	46.038	36.512	3.5	3.3	249	405	2,800	3,700	H715332—H715311	8.6	0.47	1.27	0.70	78.0	84.0	3.5	132.0	118.0	3.3	8.0	4.5	3.55
61.912	110.000	22.000	21.996	18.824	0.8	1.3	91.6	126	3,400	4,500	392—394A	0.8	0.40	1.49	0.82	69.0	70.0	0.8	104.5	101.0	1.3	4.0	4.5	0.86
	130.175	36.512	33.338	23.812	3.5	3.3	154	183	2,600	3,700	HM911249—HM911210	-5.3	0.82	0.73	0.40	74.0	85.0	3.5	123.6	109.0	3.3	8.5	4.0	2.03
	146.050	41.275	39.688	25.400	3.5	3.3	213	256	2,300	3,300	H913842—H913810	-4.3	0.78	0.77	0.42	82.0	90.0	3.5	138.0	124.0	3.3	11.0	5.5	3.11
63.500	107.950	25.400	25.400	19.050	1.5	3.3	102	158	3,400	4,500	29586—29520	0.8	0.46	1.31	0.72	71.0	73.0	1.5	103.0	96.0	3.3	6.0	3.0	0.92
	110.000	22.000	21.996	18.824	1.5	1.3	91.6	126	3,400	4,500	390A—394A	0.8	0.40	1.49	0.82	70.0	73.0	1.5	104.0	101.0	1.3	4.0	4.5	0.83
	110.000	22.000	21.996	18.824	3.5	1.3	91.6	126	3,400	4,500	395—394A	0.8	0.40	1.49	0.82	70.0	77.0	3.5	104.0	101.0	1.3	4.0	4.5	0.82
	110.000	25.400	25.400	19.050	3.5	1.3	102	158	3,400	4,500	29585—29521	0.8	0.46	1.31	0.72	71.0	77.0	3.5	104.0	99.0	1.3	6.0	3.0	0.98

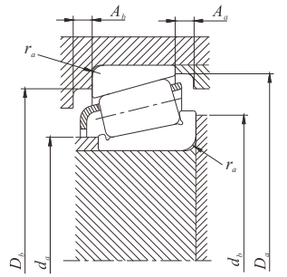
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





d 63.500~66.675 mm

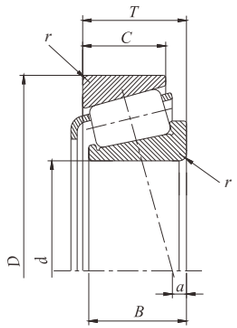
Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)							Reference mass (kg)
					r(Min)										Shaft			Housing			Cage	
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	$a^{1)}$	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
63.500	112.712	30.162	30.162	23.812	3.5	3.3	155	224	3,300	4,500	39585—39520	0.8	0.46	1.31	0.97	71.0	77.0	3.5	107.0	101.0	3.3	7.0	5.0	1.22
	120.000	29.794	29.007	24.237	0.8	2.0	133	186	3,200	4,200	477—472	4.1	0.38	1.56	0.86	72.0	73.0	0.8	114.0	107.0	2.0	6.5	4.0	1.46
	122.238	38.100	38.354	29.718	3.5	3.3	209	279	3,200	4,300	HM212046—HM212011	10.9	0.34	1.78	0.98	73.0	80.0	3.5	116.0	108.0	3.3	9.0	6.5	1.94
	122.238	43.658	43.764	36.512	3.5	3.3	219	327	3,200	4,300	5584—5535	12.2	0.36	1.67	0.92	75.0	81.0	3.5	116.0	106.0	3.3	7.5	4.0	2.29
	127.000	36.512	36.170	28.575	3.5	3.3	182	263	3,000	4,000	565—563	8.1	0.36	1.65	0.91	73.0	80.0	3.5	120.0	112.0	3.3	7.5	4.0	2.08
	135.775	53.975	56.007	44.450	4.3	3.3	298	404	3,000	4,000	6382—6320	19.3	0.32	1.85	1.02	77.0	84.0	4.3	126.0	117.0	3.3	9.0	6.0	3.68
	136.525	36.512	33.236	23.520	2.3	3.3	158	193	2,500	3,500	78250—78537	-7.9	0.87	0.69	0.38	79.0	85.0	2.3	130.0	115.0	3.3	9.0	4.0	2.26
	136.525	41.275	41.275	31.750	3.5	3.3	252	335	2,900	3,800	H414235—H414210	10.9	0.36	1.67	0.92	78.0	82.0	3.5	129.0	121.0	3.3	9.0	6.0	2.91
64.986	112.712	30.162	30.924	23.812	2.3	3.3	155	224	3,300	4,500	39586—39520	6.6	0.34	1.77	0.97	72.0	76.0	2.3	107.0	101.0	3.3	7.0	5.0	1.20
65.000	105.000	24.000	23.000	18.500	3.0	1.0	100	139	3,500	4,700	JLM710949—JLM710910	0.3	0.45	1.32	0.73	71.0	77.0	3.0	101.0	96.0	1.0	6.5	4.0	0.72
	110.000	28.000	28.000	22.500	3.0	2.5	131	195	3,400	4,600	JM511946—JM511910	3.3	0.40	1.49	0.82	72.0	78.0	3.0	105.0	99.0	2.5	6.5	4.5	1.05
	120.000	39.000	38.500	32.000	3.0	2.5	207	283	3,200	4,300	JH211749—JH211710	10.7	0.34	1.78	0.98	74.0	80.0	3.0	114.0	107.0	2.5	9.0	6.0	1.86
	120.000	39.000	38.500	32.000	7.0	2.5	207	283	3,200	4,300	JH211749A—JH211710	10.7	0.34	1.78	0.98	74.0	88.0	7.0	114.0	107.0	2.5	9.0	6.0	1.83
65.088	135.755	53.975	56.007	44.450	3.5	3.3	298	404	3,000	4,000	6379—6320	19.3	0.32	1.85	1.02	77.0	84.0	3.5	126.0	117.0	3.3	9.0	6.0	3.61
	136.525	46.038	46.038	36.512	3.5	3.3	249	405	2,800	3,700	H715340—H7154311	8.6	0.47	1.27	0.70	82.0	88.0	3.5	132.0	118.0	3.3	8.0	4.5	3.38
65.883	122.238	43.658	43.764	36.512	3.5	3.3	219	327	3,200	4,300	5595—5535	12.2	0.36	1.67	0.92	77.0	83.0	3.5	116.0	106.0	3.3	7.5	4.0	2.21
66.675	110.000	22.000	21.996	18.824	0.8	1.3	91.6	126	3,400	4,500	395A—394A	0.8	0.40	1.49	0.82	73.0	73.0	0.8	104.0	101.0	1.3	4.0	4.5	1.06
	110.000	22.000	21.996	18.824	3.5	1.3	91.6	126	3,400	4,500	395S—394A	0.8	0.40	1.49	0.82	73.0	79.0	3.5	104.0	101.0	1.3	4.0	4.5	0.78
	112.712	30.162	30.048	23.812	3.5	0.8	129	191	3,400	4,500	3984—3925	4.6	0.40	1.49	0.82	74.0	80.0	3.5	106.0	101.0	0.8	6.5	3.5	1.14
	112.712	30.162	30.162	23.812	3.5	3.3	155	224	3,300	4,500	39590—39520	6.6	0.34	1.77	0.97	74.0	80.0	3.5	107.0	101.0	3.3	7.0	5.0	1.13
	112.712	30.162	30.162	23.812	3.5	0.8	155	224	3,300	4,500	39590—39521	6.6	0.34	1.77	0.97	74.0	80.0	3.5	107.0	103.0	0.8	7.0	5.0	1.15
	122.238	38.100	38.354	29.718	3.5	1.5	209	279	3,200	4,300	HM212049—HM212010	10.9	0.34	1.78	0.98	75.0	82.0	3.5	116.0	110.0	1.5	9.0	6.5	1.85
	127.000	36.512	36.512	26.988	3.5	1.5	179	256	3,000	4,000	HM813844—HM813811	3.8	0.50	1.20	0.66	78.0	85.0	3.5	121.0	113.0	1.5	8.0	4.0	1.99
	130.175	41.275	41.275	31.750	3.5	3.3	216	298	3,000	3,900	641—633	11.2	0.36	1.66	0.91	77.0	83.0	3.5	124.0	116.0	3.3	8.5	5.0	2.38
	135.755	53.975	56.007	44.450	4.3	3.3	298	404	3,000	4,000	6386—6320	19.3	0.32	1.85	1.02	77.0	87.0	4.3	126.0	117.0	3.3	9.0	6.0	3.54
	135.755	53.975	56.007	44.450	6.4	3.3	298	404	3,000	4,000	6389—6320	19.3	0.32	1.85	1.02	77.0	91.0	6.4	126.0	117.0	3.3	9.0	6.0	3.52
	136.525	41.275	41.275	31.750	3.5	3.3	252	335	2,900	3,800	H414242—H414210	10.9	0.36	1.67	0.92	81.0	85.0	3.5	129.0	121.0	3.3	9.0	6.0	2.81

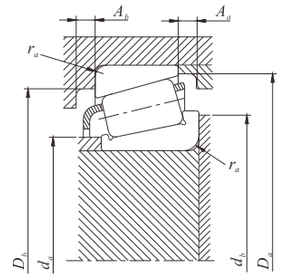
Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

2) ** represents that the inner ring adopts combined fillet.

Inch series





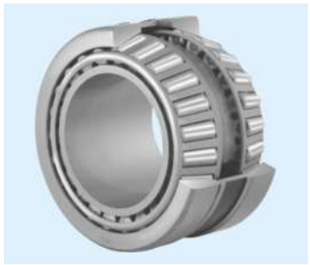
d 66.675~70.000 mm

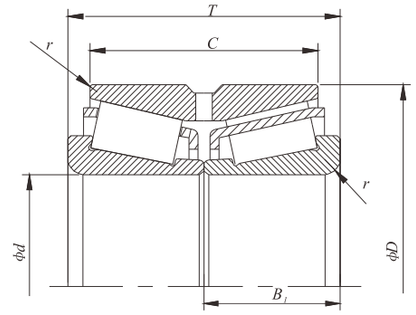
Boundary dimensions (mm)							Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Application point position mm	Constant	Axial load coefficient		Mounting dimensions (mm)								Reference mass (kg)
					r(Min)											Shaft			Housing			Cage		
d	D	T	B	C	Inner ring	Outer ring	C_r	C_{0r}	Grease	Oil	Inner ring—Outer ring	a[1]	e	Y_1	Y_0	d_a	d_b	r_a(Max)	D_a	D_b	r_a(Max)	A_a	A_b	
66.675	136.525	46.038	46.038	36.512	3.5	3.3	252	335	2,800	3,700	H715341—H715311	8.6	0.47	1.27	0.70	84.0	90.0	3.5	132.0	118.0	3.3	8.0	4.5	3.26
	177.800	57.150	53.975	37.308	3.5	3.3	352	413	2,100	2,900	HH914449—HH914442	0.3	0.80	0.75	0.41	85.0	106.0	3.5	165.0	146.0	3.3	14.0	6.0	6.73
68.262	110.000	22.000	21.996	18.824	2.3	1.3	91.6	126	3,400	4,500	399A—394A	0.8	0.40	1.49	0.82	74.0	78.0	2.3	104.0	101.0	1.3	4.0	4.5	0.74
	110.000	22.000	21.996	18.824	5.0	1.3	91.6	126	3,400	4,500	399AS—94A	0.8	0.40	1.49	0.82	74.0	83.0	5.0	104.0	101.0	1.3	4.0	4.5	0.72
	117.475	30.162	30.162	23.812	3.5	3.3	128	197	3,200	4,200	33269—33462	2.8	0.44	1.38	0.76	76.0	82.0	3.5	112.0	104.0	3.3	6.5	3.5	1.29
	127.000	36.512	36.170	28.575	3.5	3.3	182	263	3,000	4,000	570—563	8.1	0.36	1.65	0.91	77.0	83.0	3.5	120.0	112.0	3.3	7.5	4.0	1.94
	136.525	41.275	41.275	31.750	3.5	3.3	252	335	2,900	3,800	H414245—H414210	10.9	0.36	1.67	0.92	82.0	86.0	3.5	129.0	121.0	3.3	9.0	6.0	2.75
	136.525	46.038	46.038	36.512	3.5	3.3	249	405	2,800	3,700	H715343—H715311	8.6	0.47	1.27	0.70	84.0	90.0	3.5	132.0	118.0	3.3	8.0	4.5	3.26
	152.400	47.625	46.038	31.750	3.5	3.3	264	306	2,700	3,600	9185—9121	3.8	0.66	0.91	0.50	81.0	94.0	3.5	145.0	130.0	3.3	11.5	6.5	3.83
	161.925	49.212	46.038	31.750	3.5	3.3	275	330	2,100	2,900	9278—9220	0.0	0.71	0.85	0.47	90.4	97.0	3.5	153.0	138.0	3.3	12.0	4.5	4.64
69.850	99.271	17.000	16.000	13.000	1.5	1.5	45.2	75.0	3,500	4,700	LL713149—LL713110	-4.6	0.46	1.29	0.75	75.0	77.0	1.5	95.0	91.0	1.5	5.0	1.0	0.38
	112.712	22.225	21.996	15.875	1.5	0.8	93.4	131	3,300	4,400	LM613449—LM613410	0.0	0.42	1.44	0.79	76.0	78.0	1.5	107.0	104.0	0.8	7.0	4.5	0.77
	112.712	25.400	25.400	19.050	1.5	3.3	102	166	3,200	4,300	29675—29620	-1.0	0.49	1.23	0.68	77.0	80.0	1.5	109.0	101.0	3.3	6.0	3.5	0.95
	117.745	30.162	30.162	23.812	3.5	3.3	128	197	3,200	4,200	33275—33462	2.8	0.44	1.38	0.76	77.0	84.0	3.5	112.0	104.0	3.3	6.5	3.5	1.25
	120.000	29.002	29.007	23.444	3.5	3.3	133	186	3,200	4,200	482—472A	4.1	0.38	1.56	0.86	77.0	83.0	3.5	114.0	106.0	3.3	6.5	5.0	1.27
	120.000	29.794	29.007	24.237	3.5	2.0	133	186	3,200	4,200	482—472	4.1	0.38	1.56	0.86	77.0	83.0	3.5	114.0	107.0	2.0	6.5	4.0	1.30
	120.000	32.545	32.545	26.195	3.5	3.3	166	249	3,100	4,200	47487—47420	6.4	0.36	1.67	0.92	78.0	84.0	3.5	114.0	107.0	3.3	6.5	4.0	1.46
	120.650	32.545	32.545	26.195	3.5	0.5	166	249	3,100	4,200	47487—47420A	6.4	0.36	1.67	0.92	78.0	84.0	3.5	114.0	109.0	0.5	6.5	4.0	1.47
	127.000	36.512	36.170	28.575	3.5	3.3	182	263	3,000	4,000	566—563	8.1	0.36	1.65	0.91	78.0	85.0	3.5	120.0	112.0	3.3	7.5	4.0	1.89
	146.050	41.275	39.688	25.400	3.5	3.3	213	256	2,300	3,300	H913849—H913810	-4.3	0.78	0.77	0.42	82.0	95.0	3.5	138.0	124.0	3.3	11.0	5.5	2.85
	146.050	41.275	41.275	31.750	3.5	3.3	229	335	2,600	3,400	655—653	7.9	0.41	1.47	0.81	82.0	88.0	3.5	139.0	131.0	3.3	8.0	5.0	3.24
	150.089	44.450	46.672	36.512	3.5	3.3	294	417	2,500	3,400	745A—742	11.9	0.33	1.84	1.01	82.0	88.0	3.5	142.0	134.0	3.3	9.5	7.0	3.88
	168.275	53.975	56.363	41.275	3.5	3.3	379	522	2,300	3,100	835—832	18.5	0.30	2.00	1.10	84.0	91.0	3.5	155.0	149.0	3.3	11.0	7.5	6.15
69.952	121.442	24.608	23.012	17.462	2.0	2.0	94.6	137	3,000	4,000	34274—34478	-1.5	0.45	1.33	0.73	78.0	81.0	2.0	116.0	110.0	2.0	7.0	3.0	1.08
70.000	110.000	26.000	25.000	20.500	1.0	2.5	106	168	3,300	4,400	JLM812049—JLM813010	-0.3	0.49	1.23	0.68	77.0	78.0	1.0	105.0	98.0	2.5	6.0	4.0	0.88
	115.000	29.000	29.000	23.000	3.0	2.5	139	198	3,200	4,300	JM612949—JM612910	2.5	0.43	1.39	0.77	77.0	83.0	3.0	110.0	103.0	2.5	7.5	5.0	1.13

Remarks:

1) When a is negative, it represents that the effective load center is on the outer side of the bearing.

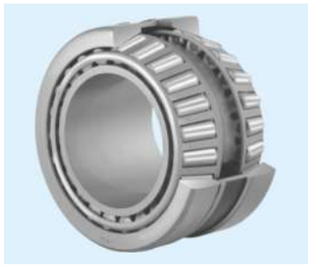
2) ** represents that the inner ring adopts combined fillet.

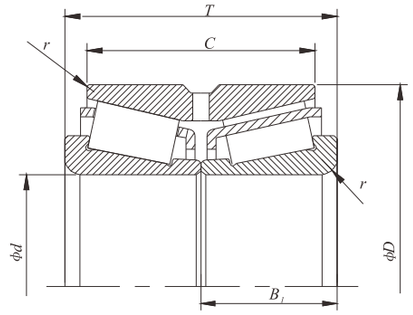




d 80~100 mm

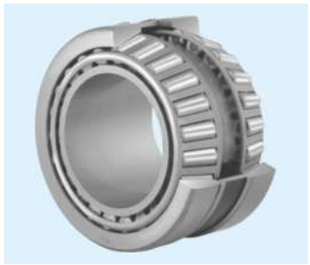
Boundary dimensions (mm)							Basic load ratings (kN)		Calculating coefficient				Limiting speeds (r/min)			Nominal numbers	Reference mass (kg)
d	D	T	C	B_1	r(Min) Inner ring	r(Min) Outer ring	C_r	C_{0r}	e	Y_1	Y_2	Y_0	Grease	Oil			
80	110	46	38	20	1.0	0.2	186	258	0.35	1.93	2.86	1.88	2600	3600		**352916**	1.14
	125	66	52	29	1.5	0.6	684	478	0.42	1.61	2.39	1.57	2300	3100		**352016**	1.28
	140	64	51.5	—	2.5	0.6	256	364	0.42	1.61	2.39	1.57	2200	2900		**350216**	3.91
	140	78	63.5	33	2.5	0.6	321	488	0.42	1.61	2.39	1.57	2200	2900		**352216**	3.91
	170	92	73	—	3.0	1.0	456	622	0.35	1.96	2.91	1.91	1800	2500		**350316**	9.57
	170	94	63	39	3.0	1.0	384	530	0.83	0.81	1.21	0.8	1600	2400		**351316**	9.44
	170	131	104	—	3.0	1.0	595	881	0.35	1.96	2.91	1.91	1900	2500		**352316**	13.6
85	130	67	53	29	1.5	0.6	257	468	0.44	1.53	2.28	1.5	2400	3200		**352017**	4.78
	150	70	57	—	2.5	0.6	289	416	0.42	1.61	2.39	1.57	2000	2700		**350217**	4.94
	150	86	69	36	2.5	0.6	368	567	0.42	1.61	2.39	1.57	2000	2700		**352217**	6.07
	180	98	77	—	4.0	1.0	491	671	0.35	1.96	2.91	1.91	1700	2300		**350317**	11.4
	180	99	66	41	4.0	1.0	520	730	0.83	0.81	1.21	0.8	1600	2400		**351317**	10.72
	180	137	108	—	4.0	1.0	680	1030	0.35	1.96	2.91	1.91	1800	2400		**352317**	15.9
90	140	73	57	32	2.0	0.6	305	552	0.42	1.61	2.39	1.57	2100	2800		**352018**	4.08
	160	74	61	—	2.5	0.6	324	470	0.42	1.61	2.39	1.57	1900	2500		**350218**	5.99
	160	94	77	—	2.5	0.6	417	651	0.42	1.61	2.39	1.57	1900	2500		**352218**	7.61
	190	102	81	—	4.0	1.0	536	736	0.35	1.96	2.91	1.91	1600	2200		**350318**	13.2
	190	144	115	—	4.0	1.0	715	1070	0.35	1.96	2.91	1.91	1700	2200		**352318**	18.6
	190	103	70	43	4.0	1.0	453	630	0.83	0.81	1.21	0.8	1700	2200		**351318**	13.75
95	145	73	57	32	2.0	0.6	312	574	0.44	1.53	2.28	1.5	2100	2800		**352019**	4.19
	170	100	83	43	3.0	1.0	533	878	0.42	1.61	2.39	1.57	1900	2600		**352219**	9.44
	200	109	74	45	4.0	1.0	501	710	0.83	0.81	1.21	0.8	1450	2100		**351319**	16.2
100	140	57	47	25	1.5	0.2	217	437	0.33	2.05	3.05	2.38	2000	2800		**352920**	2.31
	150	73	57	32	2.0	0.6	317	596	0.46	1.48	2.36	1.44	2000	2700		**352020**	4.43
	180	107	87	46	3.0	1.0	409	608	0.42	1.61	2.39	1.57	1700	2200		**352220**	8.6
	215	112	87	—	4.0	1.0	655	912	0.35	1.96	2.91	1.91	1500	1900		**350320**	18.8
	215	124	81	51	4.0	1.0	641	930	0.83	0.81	1.21	0.8	1400	1900		**351320**	20.0
	215	162	127	—	4.0	1.0	892	1360	0.35	1.96	2.91	1.91	1500	2000		**352320**	27.1

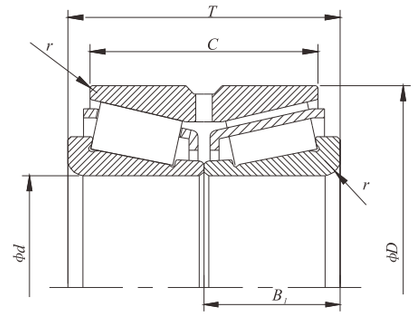




d 105~140 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Calculating coefficient				Limiting speeds (r/min)			Nominal numbers	Reference mass (kg)
d	D	T	C	B_1	r(Min) Inner ring	r(Min) Outer ring	C_r	C_{0r}	e	Y_1	Y_2	Y_0	Grease	Oil			
105	160	80	62	35	2.5	0.6	369	688	0.44	1.52	2.26	1.48	1900	2600		**352021**	5.6
	190	115	95	50	3.0	1.0	672	1134	0.42	1.61	2.39	1.57	1700	2300		**352221**	13.98
	225	127	83	53	4.0	1.0	689	1000	0.83	0.81	1.21	0.8	1300	1700		**351321**	22.5
110	170	86	68	38	2.5	0.6	425	790	0.43	1.57	3.24	1.54	1800	2400		**352022**	16.54
	180	95	76	42	2.0	0.6	—	—	—	—	—	—	1600	2100		**352122**	—
	200	92	74	—	3.0	1.0	513	781	0.42	1.61	2.39	1.57	1500	2000		**350222**	11.9
	200	121	101	53	3.0	1.0	693	1150	0.42	1.61	2.39	1.57	1500	2000		**352222**	15.6
	240	118	93	—	4.0	1.0	746	1030	0.35	1.96	2.91	1.91	1300	1700		**350322**	24.8
	240	181	142	—	4.0	1.0	1060	1630	0.35	1.96	2.91	1.91	1300	1700		**352322**	38.1
	240	137	87	57	4.0	1.0	783	1170	0.83	0.81	1.21	0.8	1200	1600		**351322**	27.96
120	180	88	70	38	2.5	0.6	442	854	0.46	1.48	2.19	1.44	1500	2100		**352024**	7.57
	200	110	90	48	2.0	0.6	—	—	—	—	—	—	1400	1900		**352124**	—
	215	97	78	—	3.0	0.6	550	851	0.44	1.55	2.31	1.52	1400	1800		**350224**	14.3
	215	132	109	58	3.0	1.0	742	1240	0.44	1.55	2.31	1.52	1400	1900		**352224**	19.4
	260	128	101	—	4.0	1.0	883	1250	0.35	1.96	2.91	1.91	1200	1600		**350324**	37.9
	260	188	145	—	4.0	1.0	1230	1920	0.35	1.96	2.91	1.91	1200	1600		**352324**	46.2
	260	148	96	62	4.0	1.0	924	1390	0.83	0.81	1.21	0.8	1000	1450		**351324**	36.11
130	200	102	80	45	2.5	0.6	583	1126	0.43	1.56	2.32	1.52	1400	1900		**352026**	11.54
	210	110	90	48	2.0	0.6	—	—	—	—	—	—	1400	1800		**352126**	—
	230	98	78.5	—	4.0	1.0	596	917	0.44	1.55	2.31	1.52	1300	1700		**350226**	16.3
	230	145	117.5	64	4.0	1.0	873	1490	0.44	1.55	2.31	1.52	1300	1700		**352226**	24.1
	280	137	107.5	—	5.0	1.5	1020	1460	0.35	1.96	2.91	1.91	1100	1400		**350326**	39
	280	205	163.5	—	5.0	1.5	1450	2290	0.35	1.96	2.91	1.91	1100	1400		**352326**	58.3
	280	156	100	66	5.0	1.1	1337	1560	0.83	0.81	1.21	0.8	950	1400		**351326**	43.1
140	210	104	82	45	2.5	0.6	593	1170	0.46	1.48	2.19	1.44	1300	1900		**352028**	12.23
	225	115	90	50	2.5	1.0	—	—	—	—	—	—	1200	1700		**352128**	—
	250	102	82.5	—	4.0	1.0	665	1030	0.44	1.55	2.31	1.52	1200	1500		**350228**	20.2
	250	153	125.5	68	4.0	1.0	1000	1720	0.44	1.55	2.31	1.52	1200	1600		**352228**	30.3
	300	145	115.5	—	5.0	1.5	1160	1680	0.35	1.96	2.91	1.91	1000	1300		**350328**	47.2
	300	223	177.5	—	5.0	1.5	1690	2710	0.35	1.96	2.91	1.91	1000	1300		**352328**	72.6
	300	168	108	70	5.0	1.1	1188	1800	0.83	0.81	1.21	0.8	850	1300		**351328**	57.1





d 150 mm

Boundary dimensions (mm)							Basic load ratings (kN)		Calculating coefficient				Limiting speeds (r/min)			Nominal numbers	Reference mass (kg)
d	D	T	C	B_1	r(Min) Inner ring	r(Min) Outer ring	C_r	C_{0r}	e	Y_1	Y_2	Y_0	Grease	Oil			
150	225	110	86	48	3.0	1.0	670	1336	0.46	1.48	2.19	1.44	1300	1700		**352030**	—
	250	138	112	60	2.5	1.0	—	—	—	—	—	—	1100	1600		**352130**	—
	270	109	87	—	4.0	1.0	764	1200	0.44	1.55	2.31	1.52	1100	1400		**350230**	25.4
	270	164	130	73	4.0	1.0	1050	1760	0.44	1.55	2.31	1.52	1100	1400		**352230**	38.2
	320	154	120	—	5.0	1.5	1300	1890	0.35	1.96	2.91	1.91	930	1200		**350330**	56.9
	320	178	114	75	5.0	1.1	1340	2040	0.83	0.81	1.21	0.8	800	1200		**351330**	68.7

Spherical roller bearing

Spherical roller bearing

Spherical roller bearing

A spherical roller bearing has two sets of rollers. The outer raceway is a spherical surface, and the inner ring has two raceways inclining with an angle to the bearing axis. The bearing is capable of self-alignment, therefore the bearing is not easily affected by the misalignment of the shaft, housing or the deflection of the shaft. Spherical roller bearings can handle high radial load, as well as bidirectional axial load.

Applications of spherical roller bearings include: engineering machinery, grain machinery, paper manufacturing machinery, escalator machinery, railway vehicle axle, rolling mill gearbox, rolling mill rollers, crushers, vibration screens, petroleum machinery, textile machinery, printing machinery, woodworking machinery and various reducers.

The spherical roller bearings of C&U are equipped with symmetrical large diameter spherical rollers (reinforce type), which can take extremely heavy load and vibration load. The internal design varies slightly by series and size. C&U can provide CC structure and CAC structure and E-type reinforced structure spherical roller bearings.

The internal bores of spherical roller bearings include cylindrical bore and tapered bore. Tapered bore's taper is 1: 12 (suffix code is K) or 1: 30 (suffix code is K30). C&U can provide spherical roller bearings whose inner surfaces have cylindrical bore or tapered bore, and most of C&U spherical roller bearings have tapered bores with taper 1: 12 (suffix code is K). Only the tapering of the spherical roller bearings of 24000 series and 24100 series is 1: 30 (suffix code is K30).

C&U can provide spherical roller bearings with lubricating oil groove and oil hole in the outer ring. The following specification table does not include the dimensions and data of bearings with lubricating oil groove and oil hole. Please consult C&U if necessary.

C&U can also provide spherical roller bearings with seals. There are various seal structures according to working conditions and the internal structures of spherical roller bearings.

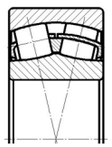


Fig. 1

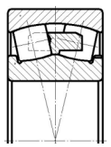


Fig. 2

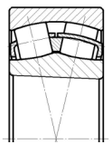


Fig. 3

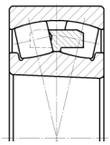


Fig. 4

1. Structure type

(1) 20000 CC (Fig. 1)
Inner ring without rib on both sides, movable spacer, symmetrical spherical rollers, two pressed cages and cylindrical inner bore surface.

(2) 20000 CAC (Fig. 2)
Inner ring with ribs on both sides, symmetrical spherical rollers, 1 brass solid cage, cylindrical inner bore surface. surface.

(3) 20000 CCK (Fig. 3)
Inner ring without rib on either side, movable spacer, symmetrical spherical rollers, two pressed cages, inner bore with taper, which is 1: 12 (suffix code is K) or 1:30 (suffix code is K30).

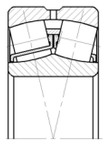
(4) 20000 CCAK (Fig. 4)
Inner ring with ribs on both sides, symmetrical spherical rollers, one brass solid cage, inner bore surface with taper 1: 12(suffix code is K) or 1:30(suffix code is K30).

(5)20000 CC/W33 (Fig. 5)
Inner ring without rib on either side, movable spacer, symmetrical spherical rollers, two pressed cages, outer ring with lubricating oil groove and oil hole, cylindrical inner bore surface.

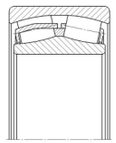
(6) 20000 CAC/W 33 (Fig. 6)
Inner ring with ribs on both sides, symmetrical spherical rollers, one brass solid cage, outer ring with lubricating groove and oil hole, cylindrical inner bore surface.

(7)20000 CCK/W 33 (Fig. 7)
Inner ring without rib on either sides, movable spacer, symmetrical spherical rollers, 2 pressed cages, outer ring with lubricating groove and oil hole, inner bore surface with taper 1: 12 (suffix code is K) or 1:30(suffix code is K30).

(8) 20000 CACK/W 33 (Fig. 8)
Inner ring with ribs on both sides, symmetrical spherical rollers, a brass solid cage, outer ring with lubricating groove and oil hole, inner bore surface with tape 1: 12 (suffix code is K), or 1: 30(suffix code is K30).



Reinforced spherical roller bearing



Spherical roller bearing with extended outer ring

2. Dimensional accuracy & running accuracy

C&U standard spherical roller bearings have universal tolerances. C&U can also provide high-precision spherical roller bearings. For the corresponding dimensional accuracy and running accuracy requirements, please refer to Section 5 for the technical explanation.

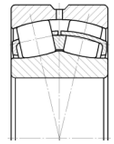


Fig. 5

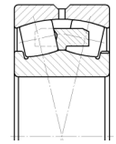


Fig. 6

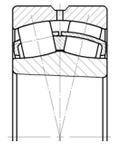


Fig. 7

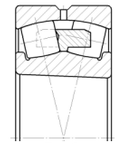


Fig. 8

3. Radial clearance

C&U standard spherical roller bearings adopt normal clearance. To meet the requirements of different working environments and installations, C&U can also provide large clearance spherical roller bearings, or C2 clearance spherical roller bearings which is smaller than normal clearance.
Please refer to Section 6 for the technical specifications of radial clearance values for spherical roller bearings with cylindrical bores. These data are the clearance value without load before the bearing mounting.

4. Cage

Cages for CC type structure are made from pressed steel sheets. Cages for CAC type structure uses solid brass cages.

5. Allowable misalignment angle

The internal structure design of spherical roller bearings enable them to self-align, which allows the bearing to correct the angle misalignment between the inner and outer rings.
In common loading and working conditions, the misalignment angle values given in Table 1 are permitted when the inner ring is running. Whether this given value can be reached also depends on the design of the bearing arrangement and seal type, etc.

6. Dynamic Equivalent Load

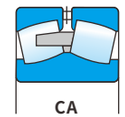
When $F_a/F_r \leqslant e$, $P=F_r+Y_1F_a$
When $F_a/F_r > e$ $P=0.67F_r+Y_2F_a$
The relevant calculating coefficient e, Y_1, and Y_2 for each bearing can be found in the specification table.

7. Static equivalent load

$P_0= F_r+Y_0F_a$
The coefficient value Y_0 for each bearing has been given in the specification table.
According to different working conditions, C&U can produce the following types of non-standard spherical roller bearing.

Table 1

Bearing series	Allowable misalignment angle
21300 series	1°
22200 series	1.5°
22300 series	2°
23000 series	1.5°
23100 series	1.5°
23200 series	2.5°
24000 series	2°
24100 series	2.5°



CA type:
machined brass cage with guide spacer itself, and an inner ring with two small ribs

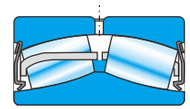
CAJD type:
optimized cage based on CA type

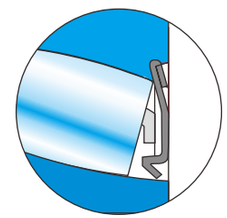
YA type:
two brass cages, a fixing mid-rib and two small ribs on the inner ring

CC type:
two pressed steel sheet cages, a spacer, and without a rib on inner ring

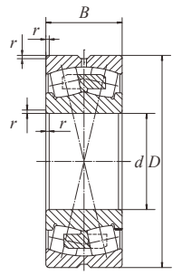
CJJD type:
two pressed steel sheet cages, no rib on the inner ring and no spacer

TN type:
two injection molded cages, no spacer, and self-guided rollers

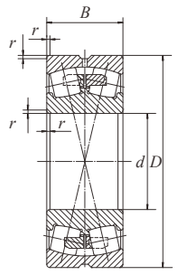




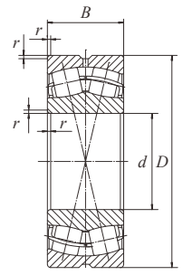
Sealed spherical roller bearings:
C&U is capable to provide spherical roller bearings with contact seals on both sides. The seals are made of oil resistant or high temperature resistant rubber with steel skeleton.



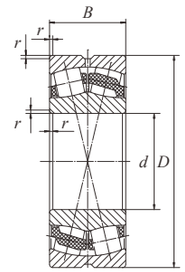
CAC Type



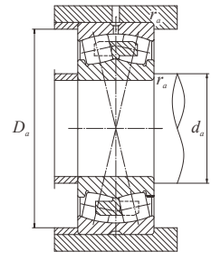
YA Type



CC Type

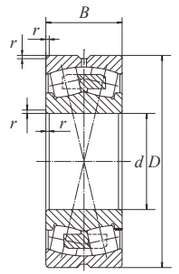


TN Type

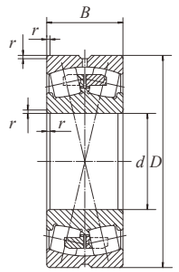


d 20~65mm

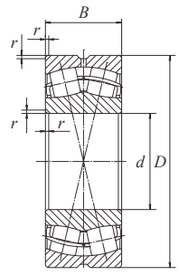
Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg)	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil	≈			d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
20	52	18	1	45.1	40.5	11050	14450	0.28	**22205/20E**		25.6	46.4	1.0	0.35	1.9	2.9	1.8
25	52	18	1	45.1	40.5	11050	14450	0.26	**22205C**	**53505**	30.6	46.4	1.0	0.35	1.9	2.9	1.8
	62	17	1	48.9	42.9	7225	10200	0.28	**21305CC**	**53305H**	32	55	1.0	0.30	2.3	3.4	2.2
30	62	20	1	59.8	56.7	8500	11900	0.29	**22206C**	**53506**	35.6	56.4	1.0	0.33	2	3	2
	72	19	1.1	69.2	63	6375	8500	0.41	**21306CC**	**53306H**	37	65	1.0	0.27	2.5	3.7	2.5
35	72	23	1.1	78.9	75.1	7650	10200	0.43	**22207C**	**53507**	42	65	1.0	0.31	2.2	3.3	2.2
	80	21	1.5	79.2	74.9	5695	8075	0.55	**21307CC**	**53307H**	44	71	1.5	0.28	2.4	3.6	2.5
40	80	23	1.1	89.4	88.4	6800	9350	0.55	**22208C**	**53508**	47	73	1.0	0.28	2.4	3.6	2.5
	90	23	1.5	97.2	94.3	5950	8075	0.71	**21308CA**	**53308H**	49	81	1.5	0.26	2.6	3.9	2.5
	90	33	1.5	137.9	136.4	5100	6800	1.10	**22308C**	**53608**	49	81	1.5	0.37	1.8	2.7	1.8
	90	33	1.5	137.9	136.4	5100	6800	1.10	**22308CA**	**53608H**	49	81	1.5	0.37	1.8	2.7	1.8
45	85	23	1.1	97.1	100.1	6375	8500	0.59	**22209C**	**53509**	52	78	1.0	0.26	2.6	3.9	2.5
	100	25	1.5	129.5	120.1	5355	7225	0.95	**21309CA**	**53309H**	54	91	1.5	0.26	2.6	3.9	2.5
	100	36	1.5	168.4	168.4	4505	5950	1.40	**22309C**	**53609**	54	91	1.5	0.37	1.8	2.7	1.8
	100	36	1.5	168.4	168.4	4505	5950	1.40	**22309CA**	**53609H**	54	91	1.5	0.37	1.8	2.7	1.8
50	90	23	1.1	97.1	102.2	5950	8075	0.87	**22210C**	**53510**	57	83	1.0	0.24	2.8	4.2	2.8
	110	27	2	143.5	153	4760	6370	1.35	**21310C**	**53310H**	61	99	2.0	0.24	2.8	4.2	2.8
	110	40	2	215.2	222	4760	6375	1.90	**22310C**	**53610**	60	100	2.0	0.37	1.8	2.7	1.8
	110	40	2	215.2	222	4080	5355	1.90	**22310CA**	**53610H**	60	100	2.0	0.37	1.8	2.7	1.8
55	100	25	1.5	120	126.1	5355	7225	0.88	**22211C**	**53511**	64	91	1.5	0.24	2.8	4.2	2.8
	120	29	2	159	160.7	4760	6375	1.60	**21311CA**	**53311H**	65	110	2.0	0.25	2.7	4	2.5
	120	43	2	248.4	257.6	3655	4760	2.40	**22311C**	**53611**	65	110	2.0	0.35	1.9	2.9	1.8
	120	43	2	248.4	257.6	3655	4760	2.40	**22311CA**	**53611H**	65	110	2.0	0.35	1.9	2.9	1.8
60	110	28	1.5	143.2	153.9	4760	6375	1.22	**22212C**	**53512**	69	101	1.5	0.24	2.8	4.2	2.8
	130	31	2.1	192.3	190.3	4080	5355	1.95	**21312CA**	**53312H**	72	118	2.0	0.24	2.8	4.2	2.8
	130	46	2.1	285	308	3400	4505	3.00	**22312C**	**53612**	72	118	2.0	0.35	1.9	2.9	1.8
	130	46	2.1	285	308	3400	4505	3.00	**22312CA**	**53612H**	72	118	2.0	0.35	1.9	2.9	1.8
65	120	31	1.5	182.2	204.5	4250	5950	1.63	**22213C**	**53513**	74	111	1.5	0.24	2.8	4.2	2.8



CAC Type



YA Type



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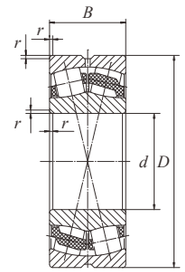
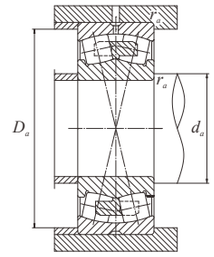
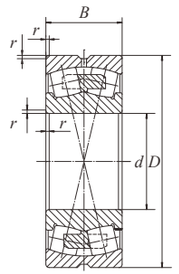


TN Type



d 70~95mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	140	33	2.1	214	226.4	3655	5100	2.45	**21313CA**	**53313H**	77	128	2.0	0.24	2.8	4.2	2.8
	140	48	2.1	313	331	3230	4250	3.60	**22313C**	**53613**	77	128	2.0	0.35	1.9	2.9	1.8
	140	48	2.1	313	331	3230	4250	3.60	**22313CA**	**53613H**	77	128	2.0	0.35	1.9	2.9	1.8
70	125	31	1.5	191	210	4250	5695	1.66	**22214C**	**53514**	79	116	1.5	0.23	2.9	4.4	2.8
	150	35	2.1	241.8	239.8	3400	4760	3.00	**21314CA**	**53314H**	82	138	2.0	0.24	2.8	4.2	2.8
	150	51	2.1	368	396	2890	3825	4.40	**22314C**	**53614**	82	138	2.0	0.35	1.9	2.9	1.8
	150	51	2.1	368	396	2890	3825	4.40	**22314CA**	**53614H**	82	138	2.0	0.35	1.9	2.9	1.8
75	130	31	1.5	195	221	4080	5355	1.75	**22215C**	**53515**	84	121	1.5	0.22	3	4.6	2.8
	160	37	2.1	284	283.4	3400	4760	3.55	**21315CA**	**53315H**	87	148	2.0	0.23	2.9	4.4	2.8
	160	55	2.1	405	437	2720	3655	5.40	**22315C**	**53615**	87	148	2.0	0.35	1.9	2.9	1.8
	160	55	2.1	405	437	2720	3655	5.40	**22315CA**	**53615H**	87	148	2.0	0.35	1.9	2.9	1.8
80	140	33	2	222	252.1	3655	5100	2.20	**22216C**	**53516**	90	130	2.0	0.22	3	4.6	2.8
	170	39	2.1	299.8	304	3230	4505	4.20	**21316CA**	**53316H**	92	158	2.0	0.23	2.9	4.4	2.8
	170	58	2.1	451	497	2550	3400	6.40	**22316C**	**53616**	92	158	2.0	0.35	1.9	2.9	1.8
	170	58	2.1	451	497	2550	3400	6.40	**22316CA**	**53616H**	92	158	2.0	0.35	1.9	2.9	1.8
85	150	36	2	266.7	308.5	3400	4760	2.80	**22217C**	**53517**	95	140	2.0	0.22	3	4.6	2.8
	180	41	3	349.5	356.2	3230	4505	5.00	**21317CA**	**53317H**	99	166	2.5	0.23	2.9	4.4	2.8
	180	60	3	506	570	2380	3230	7.40	**22317C**	**53617**	99	166	2.5	0.33	2	3	2
	180	60	3	506	570	2380	3230	7.40	**22317CA**	**53617H**	99	166	2.5	0.33	2	3	2
90	160	40	2	299.1	354.8	3230	4505	4.00	**22218C**	**53518**	100	150	2.0	0.23	2.9	4.4	2.8
	160	52.4	2	380.4	482.5	2380	3230	4.60	**23218C**	**3053218**	100	150	2.0	0.31	2.2	3.3	2.2
	190	43	3	387.8	396.8	3060	4080	5.80	**21318CA**	**53318H**	104	176	2.5	0.23	2.9	4.4	2.8
	190	64	3	560	640	2210	3060	8.80	**22318C**	**53618**	104	176	2.5	0.35	1.9	2.9	1.8
	190	64	3	560	640	2210	3060	8.80	**22318CA**	**53618H**	104	176	2.5	0.35	1.9	2.9	1.8
95	170	43	2.1	350	414	3060	4080	4.20	**22219C**	**53519**	107	158	2.0	0.24	2.8	4.2	2.8
	200	45	3	432.9	460.2	2890	3825	7.15	**21319CA**	**53319H**	109	186	2.5	0.23	2.9	4.4	2.8
	200	67	3	616	704	2210	2890	10.30	**22319C**	**53619**	109	186	2.5	0.35	1.9	2.9	1.8



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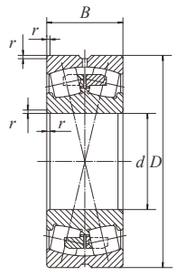
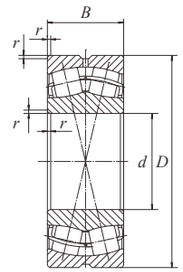
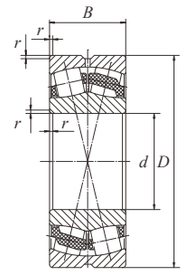


YA Type



CC Type



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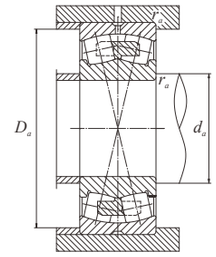
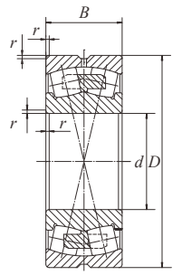


d 100~140mm

Boundary dimensions (mm) d	D	B	Chamfer (mm) r(Min)	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Grease	Oil	Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm) d_a Min	D_a Max	r_a Max	Calculating coefficient e	Y_1	Y_2	Y_0
	200	67	3	616	704	2210	2890	10.30	**22319CA**	**53619H**	109	186	2.5	0.35	1.9	2.9	1.8
100	165	52	2	394.5	536.9	2550	3400	4.40	**23120CA**	**3053720H**	110	155	2.0	0.30	2.3	3.4	2.2
	180	46	2.1	407.7	474.6	2890	3825	5.00	**22220CA**	**53520H**	112	168	2.0	0.24	2.8	4.2	2.8
	180	60.3	2.1	473.2	518.3	2040	2890	6.70	**23220CA**	**3053220H**	112	168	2.0	0.33	2	3	2
	215	47	3	391	451	2890	3825	8.80	**21320CA**	**53320H**	114	201	2.5	0.22	3	4.6	2.8
	215	73	3	750	874	2040	2890	13.0	**22320CA**	**53620H**	114	201	2.5	0.35	1.9	2.9	1.8
110	170	45	2	332	479.5	2890	3655	3.75	**23022CA**	**3053122H**	120	160	2.0	0.23	2.9	4.4	2.8
	180	56	2	458.5	644.3	2380	3060	5.55	**23122CA**	**3053722H**	120	170	2.0	0.30	2.3	3.4	2.2
	180	69	2	498.8	825.4	1870	3060	6.85	**24122CA**	**4053722H**	120	170	2.0	0.37	1.8	2.7	1.8
	200	53	2.1	534.9	622.5	2550	3400	7.40	**22222CA**	**53522H**	122	188	2.0	0.25	2.7	4	2.5
	200	69.8	2.1	621.1	829.8	1870	2720	9.70	**23222CA**	**3053222H**	122	188	2.0	0.33	2	3	2
	240	80	3	874	1030	1700	2380	18.10	**22322CA**	**53622H**	124	226	2.5	0.35	1.9	2.9	1.8
120	180	46	2	350.7	518.4	2720	3400	4.30	**23024CA**	**3053124H**	130	170	2.0	0.22	3	4.6	2.8
	180	60	2	429.3	668.3	2040	2890	5.40	**24024CA**	**4053124H**	130	170	2.0	0.30	2.3	3.4	2.2
	200	62	2	557.5	777.8	2210	2890	7.80	**23124CA**	**3053724H**	130	190	2.0	0.28	2.4	3.6	2.5
	200	80	2	716.7	1058	1615	2210	10.00	**24124CA**	**4053724H**	130	190	2.0	0.37	1.8	2.7	1.8
	215	58	2.1	580	704	2380	3230	9.20	**22224CA**	**53524H**	132	203	2.0	0.25	2.7	4	2.5
	215	76	2.1	751.6	1022	1700	2380	12.00	**23224CA**	**3053224H**	132	203	2.0	0.35	1.9	2.9	1.8
	260	86	3	926.4	1066	1700	2210	22.00	**22324CA**	**53624H**	134	246	2.5	0.35	1.9	2.9	1.8
130	200	52	2	446.1	647.1	2380	3060	6.20	**23026CA**	**3053126H**	140	190	2.0	0.23	2.9	4.4	2.8
	200	69	2	547.8	843.7	1700	2550	7.95	**24026CA**	**4053126H**	140	190	2.0	0.31	2.2	3.3	2.2
	210	64	2	633.9	897.2	2040	2720	8.55	**23126CA**	**3053726H**	140	200	2.0	0.28	2.4	3.6	2.5
	210	80	2	682.6	1011	1530	2040	11.00	**24126CA**	**4053726H**	140	200	2.0	0.35	1.9	2.9	1.8
	230	64	3	680	860	2210	3060	11.20	**22226CA**	**53526H**	144	216	2.5	0.26	2.6	3.9	2.5
	230	80	3	778.9	1064	1615	2210	14.00	**23226CA**	**3053226H**	144	216	2.5	0.33	2	3	2
	280	93	4	1087	1268	1530	2040	29.00	**22326CA**	**53626H**	148	262	3.0	0.35	1.9	2.9	1.8
140	210	53	2	519.6	773.7	2210	2890	6.70	**23028CA**	**3053128H**	150	200	2.0	0.22	3	4.6	2.8



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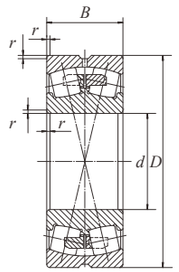
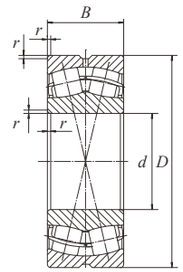


YA Type



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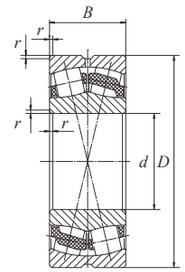
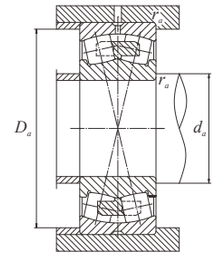
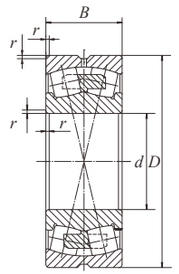


TN Type

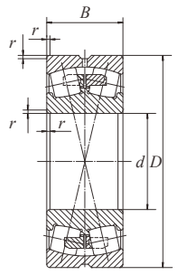


d 150~170mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	210	69	2	578	921.5	1700	2380	8.45	24028CA	4053128H	150	200	2.0	0.30	2.3	3.4	2.2
	225	68	2.1	669.7	977.7	1870	2380	10.50	23128CA	3053728H	152	213	2.0	0.28	2.4	3.6	2.5
	225	85	2.1	768.3	1188	1445	2040	13.00	24128CA	4053728H	152	213	2.0	0.35	1.9	2.9	1.8
	250	68	3	739.8	953.3	2040	2720	14.50	22228CA	53528H	154	236	2.5	0.26	2.6	3.9	2.5
	250	88	3	920.4	1282	1445	2040	18.50	23228CA	3053228H	154	236	2.5	0.33	2	3	2
	300	102	4	1247	1480	1445	1870	36.00	22328CA	53628H	158	282	3.0	0.35	1.9	2.9	1.8
150	225	56	2.1	574.2	850.2	2040	2720	8.14	23030CA	3053130H	162	213	2.0	0.22	3	4.6	2.8
	225	75	2.1	664.1	1066	1530	2210	10.50	24030CA	4053130H	162	213	2.0	0.30	2.3	3.4	2.5
	250	80	2.1	863.8	1255	1700	2210	16.00	23130CA	3053730H	162	238	2.0	0.30	2.3	3.4	2.2
	250	100	2.1	1005	1522	1275	1870	19.50	24130CA	4053730H	162	238	2.0	0.37	1.8	2.7	1.8
	270	73	3	823.1	1051	1870	2550	18.50	22230CA	53530H	164	256	2.5	0.26	2.6	3.9	2.5
	270	96	3	1161	1625	1360	1870	24.00	23230CA	3053230H	164	256	2.5	0.35	1.9	2.9	1.8
	320	108	4	1383	1656	1360	1870	43.00	22330CA	53630H	168	302	3.0	0.35	1.9	2.9	1.8
160	240	60	2.1	586	890	2040	2550	9.74	23032CA	3053132H	172	228	2.0	0.22	3	4.6	2.8
	240	80	2.1	753	1232	1445	2040	13.00	24032CA	4053132H	172	228	2.0	0.30	2.3	3.4	2.2
	270	86	2.1	1074	1520	1615	2040	20.50	23132CA	3053732H	172	258	2.0	0.30	2.3	3.4	2.2
	270	109	2.1	1205	1829	1190	1615	25.00	24132CA	4053132H	172	258	2.0	0.40	1.7	2.5	1.6
	290	80	3	1000	1320	1700	2380	22.00	22232CA	53532H	174	276	2.5	0.26	2.6	3.9	2.5
	290	104	3	1256	1777	1275	1870	30.00	23232CA	3053232H	174	276	2.5	0.35	1.9	2.9	1.8
	340	114	4	1530	1800	1275	1615	51.00	22332CA	53632H	178	322	3.0	0.35	1.9	2.9	1.8
170	260	67	2.1	730.5	1132	1870	2380	13.10	23034CA	3053134H	182	248	2.0	0.23	2.9	4.4	2.8
	260	90	2.1	918	1523	1360	2040	17.50	24034CA	4053134H	182	248	2.0	0.33	2	3	2
	280	88	2.1	1028	1523	1530	2040	21.50	23134CA	3053734H	182	268	2.0	0.30	2.3	3.4	2.2
	280	109	2.1	1220	1860	1105	1615	26.50	24134CA	4053734H	182	268	2.0	0.37	1.8	2.7	1.8
	310	86	4	1030	1340	1615	2210	29.00	22234CA	53534H	188	292	3.0	0.27	2.5	3.7	2.5
	310	110	4	1355	1920	1190	1700	36.50	23234CA	3053234H	188	292	3.0	0.35	1.9	2.9	1.8
	360	120	4	1781	2226	1190	1530	60.00	22334CA	53634H	188	342	3.0	0.33	2	3	2



CAC Type



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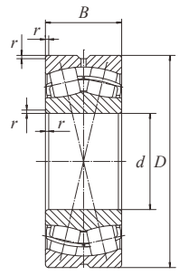
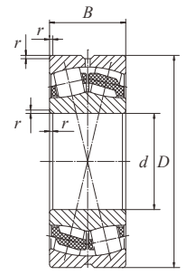


CC Type



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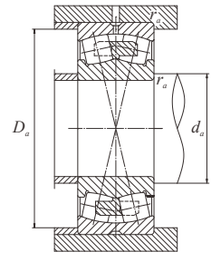
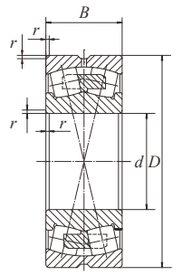
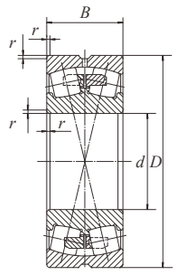


d 180~220mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
180	280	74	2.1	964.3	1453	1700	2210	17.40	**23036CA**	**3053136H**	192	268	2.0	0.24	2.8	4.2	2.8
	280	100	2.1	1095	1781	1275	1870	23.00	**24036CA**	**4053136H**	192	268	2.0	0.33	2	3	2
	300	96	3	1213	1831	1445	1870	27.50	**23136CA**	**3053736H**	194	286	2.5	0.30	2.3	3.4	2.2
	300	118	3	1413	2203	1105	1445	33.50	**24136CA**	**4053736H**	194	286	2.5	0.37	1.8	2.7	1.8
	320	86	4	1080	1430	1530	2210	30.00	**22236CA**	**53536H**	198	302	3.0	0.26	2.6	3.9	2.5
	320	112	4	1484	2166	1105	1615	39.00	**23236CA**	**3053236H**	198	302	3.0	0.35	1.9	2.8	1.8
	380	126	4	1950	2440	1105	1445	70.00	**22336CA**	**53636H**	198	362	3.0	0.35	1.9	2.8	1.8
190	290	75	2.1	1004	1553	1615	2040	18.40	**23038CA**	**3053138H**	202	278	2.0	0.23	2.9	4.4	2.8
	290	100	2.1	1120	1800	1190	1700	24.00	**24038CA**	**4053138H**	202	278	2.0	0.31	2.2	3.3	2.2
	320	104	3	1394	2115	1275	1700	34.50	**23138CA**	**3053738H**	204	306	2.5	0.31	2.2	3.3	2.2
	320	128	3	1576	2397	1020	1360	42.00	**24138CA**	**4053738H**	204	306	2.5	0.40	1.7	2.5	1.6
	340	92	4	1170	1500	1445	2040	35.30	**22238CA**	**53538H**	208	322	3.0	0.19	3.6	5.3	3.6
	340	120	4	1596	2336	1105	1530	47.50	**23238CA**	**3053238H**	208	322	3.0	0.35	1.9	2.9	1.8
	400	132	5	2122	2672	1020	1360	81.00	**22338CA**	**53638H**	212	378	4.0	0.35	1.9	2.9	1.8
200	310	82	2.1	1088	1706	1530	1870	23.40	**23040CA**	**3053140H**	212	298	2.0	0.24	2.8	4.2	2.8
	310	109	2.1	1304	2221	1105	1615	30.50	**24040CA**	**4053140H**	212	298	2.0	0.33	2	3	2
	340	112	3	1642	2495	1275	1615	42.50	**23140CA**	**3053740H**	214	326	2.5	0.31	2.2	3.3	2.2
	340	140	3	1725	2664	935	1275	52.00	**24140CA**	**4053740H**	214	326	2.5	0.40	1.7	2.5	1.6
	360	98	4	1350	1780	1360	1870	47.70	**22240CA**	**53540H**	218	342	3.0	0.26	2.6	3.9	2.5
	360	128	4	1788	2614	1020	1445	57.00	**23240CA**	**3053240H**	218	342	3.0	0.35	1.9	2.9	1.8
	420	138	5	2247	2830	1020	1275	94.00	**22340CA**	**53640H**	222	398	4.0	0.33	2	3	2
220	300	60	2.1	630	1080	1615	1870	12.5	**23944CA/W33**		231	289	2	0.16	4.2	6.3	4
	340	90	3	1226	1978	1360	1700	33.5	**23044CA/W33**	**3053144H**	233	327	2.5	0.23	2.9	4.4	2.8
	340	118	3	1507	2524	1020	1445	40.0	**24044CA/W33**	**4053144H**	233	327	2.5	0.33	2	3	2
	370	120	4	1687	2512	1105	1445	53.5	**23144CA/W33**	**3053744H**	237	353	3	0.30	2.3	3.4	2.2
	370	150	4	1950	3080	850	1190	67.0	**24144CA/W33**	**4053744H**	237	353	3	0.40	1.7	2.5	1.6
	400	108	4	1620	2170	1275	1700	60.5	**22244CA/W33**	**53544H**	237	383	3	0.27	2.5	3.7	2.5



CAC Type



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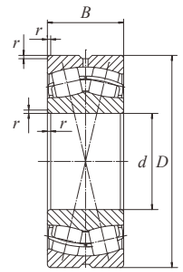
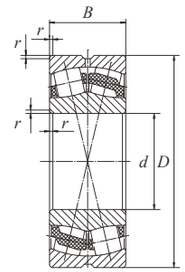
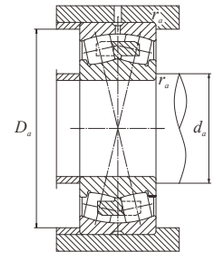


CC Type

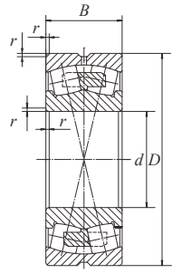


TN Type

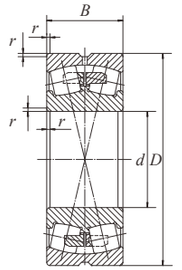


d 240~300mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	400	144	4	2226	3225	935	1275	81.5	23244CA/W33	3053244H	237	383	3	0.35	1.9	2.9	1.8
	460	145	5	2648	3387	850	1190	120.0	22344CA/W33	53644H	240	440	4	0.31	2.2	3.3	2.2
240	320	60	2.1	655	1160	1445	1700	13.5	23948CA/W33		251	309	2	0.15	4.5	6.7	4.5
	360	92	3	1371	2280	1275	1615	33.5	23048CA/W33	3053148H	253	347	2.5	0.23	2.9	4.4	2.8
	360	118	3	1536	2590	935	1360	43.0	24048CA/W33	4053148H	253	347	2.5	0.30	2.3	3.4	2.2
	400	128	4	2075	3237	1020	1360	66.5	23148CA/W33	3053748H	257	383	3	0.30	2.3	3.4	2.2
	400	160	4	2210	3590	765	1105	83.0	24148CA/W33	4053748H	257	383	3	0.40	1.7	2.5	1.6
	440	120	4	2020	2760	1105	1530	83.0	22248CA/W33	53548H	257	423	3	0.27	2.5	3.7	2.5
	440	160	4	2670	3950	808	1105	110.0	23248CA/W33	3053248H	257	423	3	0.35	1.9	2.9	1.8
	500	155	5	2850	3680	808	1105	155.0	22348CA/W33	53648H	260	480	4	0.31	2.2	3.3	2.2
260	360	75	2	920	1656	1275	1615	23.5	23952CA/W33		271	349	2	0.18	3.8	5.6	3.6
	400	104	3	1686	2728	1105	1445	48.5	23052CA/W33	3053152H	275	385	3	0.23	2.9	4.4	2.8
	400	140	3	1880	3170	850	1190	65.5	24052CA/W33	4053152H	275	385	3	0.33	2	3	2
	440	144	3	2340	3590	935	1190	90.5	23152CA/W33	3053752H	277	423	3	0.31	2.2	3.3	2.2
	440	180	3	2760	4410	723	1020	110.0	24152CA/W33	4053752H	277	423	3	0.40	1.7	2.5	1.6
	480	130	4	2350	3260	1020	1360	110.0	22252CA/W33	53552H	280	460	4	0.27	2.5	3.7	2.5
	480	174	4	2990	4390	723	1020	140.0	23252CA/W33	3053252H	280	460	4	0.35	1.9	2.9	1.8
	540	165	5	3260	4180	723	935	190.0	22352CA/W33	53652H	286	514	5	0.31	2.2	3.3	2.2
280	380	75	2.1	1012	1926	1190	1445	25.0	23956CA/W33		291	369	2	0.16	4.2	6.3	4
	420	106	4	1713	2922	1105	1360	52.0	23056CA/W33	3053156H	295	405	3	0.23	2.9	4.4	2.8
	420	140	4	1990	3490	808	1190	69.5	24056CA/W33	4053156H	295	405	3	0.31	2.2	3.3	2.2
	460	146	5	2438	3910	850	1105	97.0	23156CA/W33	3053756H	300	440	4	0.30	2.3	3.4	2.2
	460	180	5	2850	4690	680	935	120.0	24156CA/W33	4053756H	300	440	4	0.40	1.7	2.5	1.6
	500	130	5	2480	3450	935	1275	115.0	22256CA/W33	53556H	300	480	4	0.26	2.6	3.9	2.5
	500	176	5	2990	4508	680	935	150.0	23256CA/W33	3053256H	300	480	4	0.35	1.9	2.9	1.8
	580	175	6	3680	4780	680	935	235.0	22356CA/W33	53656H	306	554	5	0.30	2.3	3.4	2.2
300	420	90	3	1410	2510	1105	1360	39.5	23960CA/W33		313	407	2.5	0.19	3.6	5.3	3.6



CAC Type



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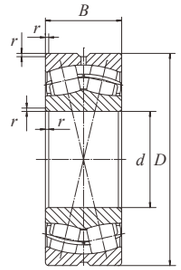

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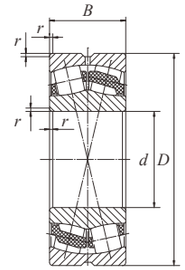

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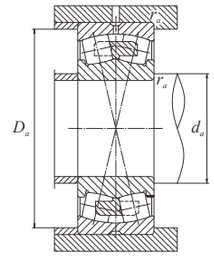
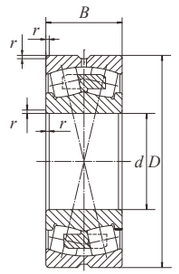
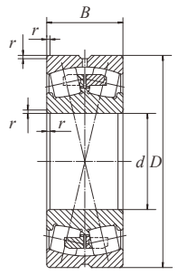


d 320~380mm

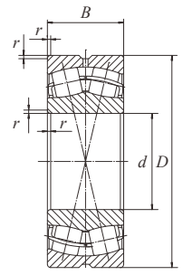
Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	460	118	4	2179	3715	1020	1275	71.5	23060CA/W33	3053160H	315	445	3	0.23	2.9	4.4	2.8
	460	160	4	2480	4370	723	1020	97	24060CA/W33	4053160H	315	445	3	0.33	2	3	2
	500	160	5	2940	4690	808	1020	125	23160CA/W33	3053760H	320	480	4	0.30	2.3	3.4	2.2
	500	200	5	3450	5790	595	850	160	24160CA/W33	4053760H	320	480	4	0.40	1.7	2.5	1.6
	540	140	5	2900	3910	850	1190	145	22260CA/W33	53560H	320	520	4	0.26	2.6	3.9	2.5
	540	192	5	3590	5380	638	850	190	23260CA/W33	3053260H	320	520	4	0.35	1.9	2.9	1.8
320	440	90	3	1430	2700	1190	1275	42	23964CA/W33		333	427	2.5	0.17	4	5.9	4
	480	121	4	2239	3910	935	1190	78	23064CA/W33	3053164H	335	465	3	0.23	2.9	4.4	2.8
	480	160	4	2620	4690	680	1020	100	24064CA/W33	4053164H	335	465	3	0.31	2.2	3.3	2.2
	540	176	5	3450	5520	723	935	165	23164CA/W33	3053764H	340	520	4	0.31	2.2	3.3	2.2
	540	218	5	3910	6530	570	765	210	24164CA/W33	4053764H	340	520	4	0.40	1.7	2.5	1.6
	580	150	5	3310	4510	808	1105	175	22264CA/W33	53564H	340	560	4	0.26	2.6	3.9	2.5
	580	208	5	4050	6160	595	808	240	23264CA/W33	3053264H	340	560	4	0.35	1.9	2.9	1.8
340	460	90	3	1516	2856	1105	1190	46	23968CA/W33		353	447	2.5	0.17	4	5.9	4
	520	133	5	2480	4180	850	1105	105	23068CA/W33	3053168H	358	502	4	0.24	2.8	4.2	2.8
	520	180	5	3170	5700	638	935	140	24068CA/W33	4053168H	358	502	4	0.33	2	3	2
	580	190	5	3910	6250	680	850	210	23168CA/W33	3053768H	360	560	4	0.31	2.2	3.3	2.2
	580	243	5	4880	7960	510	723	280	24168CA/W33	4053768H	360	560	4	0.40	1.7	2.5	1.6
	620	224	6	4690	7170	476	680	295	23268CA/W33	3053268H	366	594	5	0.35	1.9	2.9	1.8
360	480	90	3	1550	2900	1020	1105	46	23972CA/W33		373	467	2.5	0.15	4.5	6.7	4.5
	540	134	5	2530	4410	808	1020	110	23072CA/W33	3053172H	378	522	4	0.23	2.9	4.4	2.8
	540	180	5	3260	6020	595	850	145	24072CA/W33	4053172H	378	522	4	0.31	2.2	3.3	2.2
	600	192	5	3950	6390	638	850	220	23172CA/W33	3053772H	380	580	4	0.30	2.3	3.4	2.2
	600	243	5	5150	8550	536	723	280	24172CA/W33	4053772H	380	580	4	0.40	1.7	2.5	1.6
	650	232	6	4970	7630	451	638	335	23272CA/W33	3053272H	386	624	5	0.35	1.9	2.9	1.8
380	520	106	4	1800	3490	935	1020	69	23976CA/W33		395	505	3	0.17	4	5.9	4
	560	135	5	2670	4600	765	1020	115	23076CA/W33	3053176H	398	542	4	0.22	3	4.6	2.8



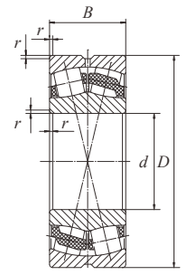
CAC Type



YA Type



CC Type



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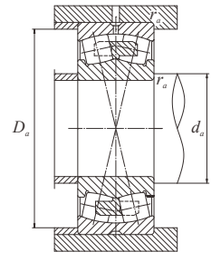
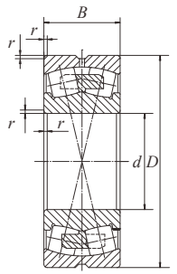
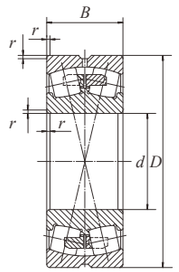


d 400~460mm

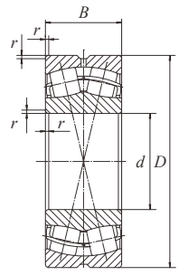
Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg)	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil	≈			d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	560	180	5	3310	6250	570	808	150	24076CA/W33	4053176H	398	542	4	0.30	2.3	3.4	2.2
	620	194	5	4050	6530	476	850	230	23176CA/W33	3053776H	400	600	4	0.30	2.3	3.4	2.2
	620	243	5	5240	9020	408	723	300	24176CA/W33	4053776H	400	600	4	0.37	1.8	2.7	1.8
	680	240	6	5380	8420	425	638	375	23276CA/W33	3053276H	406	654	5	0.35	1.9	2.9	1.8
400	540	106	4	1840	3590	850	935	71	23980CA/W33		415	525	3	0.16	4.2	6.3	4
	600	148	5	2990	5240	723	935	150	23080CA/W33	3053180H	418	582	4	0.23	2.9	4.4	2.8
	600	200	5	3960	7360	536	765	205	24080CA/W33	4053180H	418	582	4	0.30	2.3	3.4	2.2
	650	200	6	4280	7040	451	808	265	23180CA/W33	3053780H	426	624	5	0.28	2.4	3.6	2.5
	650	250	6	5700	9750	366	680	340	24180CA/W33	4053780H	426	624	5	0.37	1.8	2.7	1.8
	720	256	6	6030	9570	408	570	450	23280CA/W33	3053280H	426	694	5	0.35	1.9	2.9	1.8
	820	243	7.5	6900	9570	366	638	650	22380CA/W33	53680H	432	788	6	0.30	2.3	3.4	2.2
420	560	106	3	1880	3820	850	935	75	23984CA/W33		435	545	3	0.16	4.2	6.3	4
	620	150	4	3130	5520	510	935	155	23084CA/W33	3053184H	438	602	4	0.22	3	4.6	2.8
	620	200	4	4050	7640	451	765	210	24084CA/W33	4053184H	438	602	4	0.30	2.3	3.4	2.2
	700	224	5	5150	8560	408	765	350	23184CA/W33	3053784H	446	674	5	0.30	2.3	3.4	2.2
	700	280	5	6760	11590	340	595	445	24184CA/W33	4053784H	446	674	5	0.40	1.7	2.5	1.6
	760	272	6	6760	10670	383	536	535	23284CA/W33	3053284H	452	728	6	0.35	1.9	2.9	1.8
440	600	118	4	2250	4510	808	850	99.5	23988CA/W33		455	585	3	0.16	4.2	6.3	4
	650	157	6	3360	6030	476	850	180	23088CA/W33	3053188H	463	627	5	0.22	3	4.6	2.8
	650	212	6	4420	8420	425	723	245	24088CA/W33	4053188H	463	627	5	0.30	2.3	3.4	2.2
	720	226	6	5520	9200	383	723	360	23188CA/W33	3053788H	466	694	5	0.30	2.3	3.4	2.2
	720	280	6	6900	12140	340	595	460	24188CA/W33	4053788H	466	694	5	0.37	1.8	2.7	1.8
	790	280	7.5	7180	11500	366	510	590	23288CA/W33	3053288H	472	758	6	0.35	1.9	2.9	1.8
460	620	118	4	2300	4600	476	935	105	23292CA/W33		475	605	3	0.16	4.2	6.3	4
	680	163	6	3590	6390	476	808	205	23092CA/W33	3053192H	483	675	5	0.22	3	4.6	2.8
	680	218	6	4780	9200	408	680	275	24092CA/W33	4053192H	483	675	5	0.28	2.4	3.6	2.5
	760	240	7.5	5890	9940	366	680	440	23192CA/W33	3053792H	492	728	6	0.30	2.3	3.4	2.2



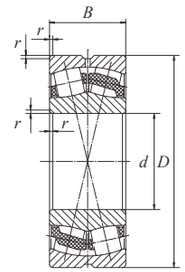
CAC Type



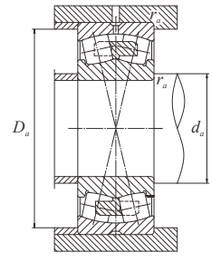
YA Type



CC Type

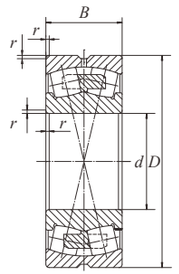


TN Type

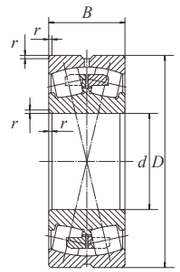


d 480~600mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	760	300	7.5	7640	13430	306	570	560	24192CA/W33	4053792H	492	728	6	0.37	1.8	2.7	1.8
	830	296	7.5	7820	12600	340	476	695	23292CA/W33	3053292H	492	798	6	0.35	1.9	2.9	1.8
480	650	128	5	2670	5240	476	850	125	23996CA/W33		498	632	4	0.18	3.8	5.6	3.6
	700	165	6	3590	6270	451	808	215	23096CA/W33	3053196H	503	677	5	0.21	3.2	4.8	3.2
	700	218	6	4880	9570	383	638	285	24096CA/W33	4053196H	503	677	5	0.28	2.4	3.6	2.5
	790	248	7.5	6390	11040	340	638	485	23196CA/W33	3053796H	512	758	6	0.30	2.3	3.4	2.2
	790	308	7.5	8280	14350	289	536	605	24196CA/W33	4053796H	512	758	6	0.37	1.8	2.7	1.8
	870	310	7.5	8560	13800	323	451	800	23296CA/W33	3053296H	512	838	6	0.35	1.9	2.9	1.8
500	670	128	5	2670	5520	451	808	130	239/500 CA/W33		518	652	4	0.17	4	5.9	4
	720	167	6	3820	7180	425	765	225	230/500 CA/W33		523	697	5	0.21	3.2	4.8	3.2
	720	218	6	5060	10120	366	595	295	240/500 CA/W33		523	697	5	0.26	2.6	3.9	2.5
	830	264	7.5	7040	11870	323	595	580	231/500 CA/W33		532	798	6	0.30	2.3	3.4	2.2
	830	325	7.5	9020	15640	272	510	700	241/500 CA/W33		532	798	6	0.37	1.8	2.7	1.8
	920	336	7.5	9750	15920	306	425	985	232/500 CA/W33		532	888	6	0.35	1.9	2.9	1.8
530	710	136	5	2940	6160	425	765	155	239/530 CA/W33		548	692	4	0.17	4	5.9	4
	780	185	6	4690	8550	383	680	310	230/530 CA/W33		553	757	5	0.22	3	4.6	2.8
	780	250	6	6160	12140	340	570	410	240/530 CA/W33		553	757	5	0.28	2.4	3.6	2.5
	870	272	7.5	7500	12880	306	570	645	231/530 CA/W33		562	838	6	0.30	2.3	3.4	2.2
	870	335	7.5	9750	17480	255	476	830	241/530 CA/W33		562	838	6	0.37	1.8	2.7	1.8
	980	355	9.5	10210	18770	255	408	1200	232/530 CA/W33		570	940	8	0.35	1.9	2.9	1.8
560	750	140	5	3170	6620	383	723	175	239/560 CA/W33		578	732	4	0.16	4.2	6.3	4
	820	195	6	5150	9380	366	638	355	230/560 CA/W33		583	797	5	0.22	3	4.6	2.8
	820	258	6	6760	13430	323	536	465	240/560 CA/W33		583	797	5	0.28	2.4	3.6	2.5
	920	280	7.5	8420	14720	289	536	740	231/560 CA/W33		592	888	6	0.30	2.3	3.4	2.2
	920	355	7.5	11040	19872	238	425	985	241/560 CA/W33		592	888	6	0.35	1.9	2.9	1.8
	1030	365	9.5	12320	20240	238	366	1350	232/560 CA/W33		600	990	8	0.35	1.9	2.9	1.8
600	800	150	5	3590	7640	366	638	220	239/600 CA/W33		618	782	4	0.17	4	5.9	4



CAC Type



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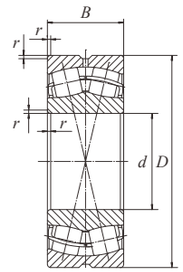

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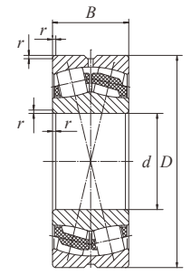
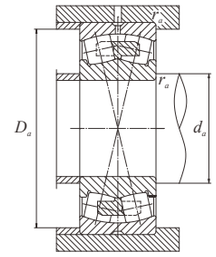
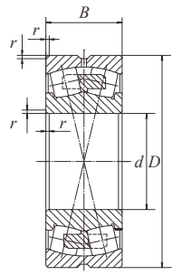


TN Type

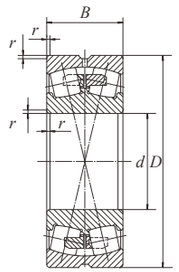


d 630~800mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	870	200	6	5520	10490	340	595	405	**230/600 CA/W33**		623	847	5	0.22	3	4.6	2.8
	870	272	6	7500	15640	289	476	52	**240/600 CA/W33**		623	847	5	0.30	2.3	3.4	2.2
	980	300	7.5	9380	16560	272	476	895	**231/600 CA/W33**		632	948	6	0.30	2.3	3.4	2.2
	980	375	7.5	12140	21710	204	408	1200	**241/600 CA/W33**		632	948	6	0.22	3	4.6	2.8
	1090	388	9.5	13800	20240	221	340	1600	**232/600 CA/W33**		640	1050	8	0.35	1.9	2.9	1.8
630	850	165	6	4280	9000	340	595	280	**239/630 CA/W33**		653	827	5	0.17	4	5.9	4
	920	212	7.5	6160	11500	323	570	485	**230/630 CA/W33**		658	892	6	0.21	3.2	4.8	3.2
	920	290	7.5	8100	16560	272	451	645	**240/630 CA/W33**		658	892	6	0.28	2.4	3.6	2.5
	1030	315	7.5	9660	19300	221	451	1050	**231/630 CA/W33**		662	998	6	0.30	2.3	3.4	2.2
	1030	400	7.5	13430	21710	187	383	1400	**241/630 CA/W33**		662	998	6	0.37	1.8	2.7	1.8
670	900	170	6	4600	9940	306	570	315	**239/670 CA/W33**		693	877	5	0.17	4	5.9	4
	980	230	7.5	7040	13430	289	510	600	**230/670 CA/W33**		698	952	6	0.21	3.2	4.8	3.2
	980	308	7.5	9200	18980	255	425	790	**240/670 CA/W33**		698	952	6	0.28	2.4	3.6	2.5
	1090	336	7.5	10030	20600	204	425	1250	**231/670 CA/W33**		702	1058	6	0.30	2.3	3.4	2.2
	1090	412	7.5	14720	26680	170	340	1600	**241/670 CA/W33**		702	1058	6	0.37	1.8	2.7	1.8
	1220	438	12	16560	28060	187	306	2270	**232/670 CA/W33**		718	1172	10	0.35	1.9	2.9	1.8
710	950	180	6	5150	11040	289	510	365	**239/710 CA/W33**		733	927	5	0.17	4	5.9	4
	1030	236	7.5	7650	15000	272	476	670	**230/710 CA/W33**		738	1002	6	0.21	3.2	4.8	3.2
	1030	315	7.5	9750	20980	221	383	895	**240/710 CA/W33**		738	1002	6	0.27	2.5	3.7	2.5
	1150	345	9.5	11250	23920	204	383	1450	**231/710 CA/W33**		750	1110	8	0.28	2.4	3.6	2.5
	1150	438	9.5	15900	29900	162	323	1900	**241/710 CA/W33**		750	1110	8	0.37	1.8	2.7	1.8
750	1000	185	6	5520	12150	272	476	420	**239/750 CA/W33**		773	977	5	0.16	4.2	6.3	4
	1090	250	7.5	8880	17100	238	408	795	**230/750 CA/W33**		778	1062	6	0.21	3.2	4.8	3.2
	1090	335	7.5	10850	23000	204	366	1065	**240/750 CA/W33**		778	1062	6	0.28	2.4	3.6	2.5
	1220	475	9.5	18400	34500	153	332	2100	**241/750 CA/W33**		790	1180	8	0.37	1.8	2.7	1.8
800	1060	195	6	5890	13160	255	451	470	**239/800 CA/W33**		823	1037	5	0.16	4.2	6.3	4
	1150	258	7.5	9200	18400	221	366	895	**230/800 CA/W33**		828	1122	6	0.20	3.4	5	3.2



CAC Type



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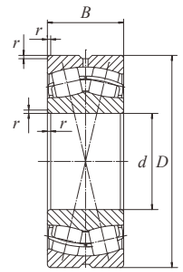
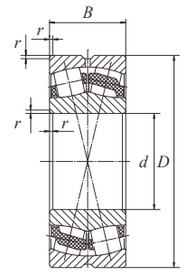


CC Type



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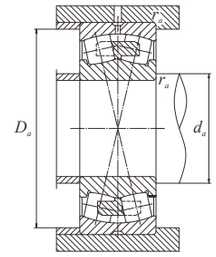
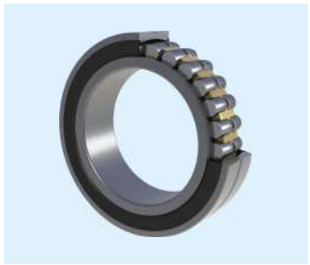
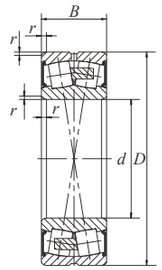


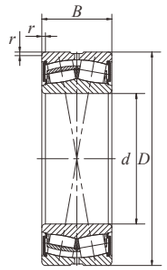
d 850~1250mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Reference mass (kg) ≈	Nominal numbers (New)	Nominal numbers (Old)	Mounting dimensions(mm)			Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}	Grease	Oil				d_a Min	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	1150	345	7.5	11350	26220	187	340	1200	**240/800 CA/W33**		828	1122	6	0.27	2.5	3.7	2.5
	1280	375	9.5	15220	28980	170	340	1920	**231/800 CA/W33**		840	1240	8	0.28	2.4	3.6	2.5
	1280	475	9.5	18720	37260	145	272	2300	**241/800 CA/W33**		840	1240	8	0.35	1.9	2.9	1.8
850	1030	136	5	3340	9200	221	451	240	**238/850 CA/W33**		868	1012	4	0.11	6.1	9.1	6.3
	1120	200	6	6110	14400	221	408	560	**239/850 CA/W33**		873	1097	5	0.16	4.2	6.3	4
	1220	272	7.5	9500	19900	187	340	1050	**230/850 CA/W33**		878	1192	6	0.20	3.4	5	3.2
	1220	365	7.5	12800	28980	170	306	1410	**240/850 CA/W33**		878	1192	6	0.27	2.5	3.7	2.5
	1360	400	12	16100	31740	153	306	2200	**231/850 CA/W33**		898	1312	10	0.28	2.4	3.6	2.5
900	1180	206	6	6380	15640	204	383	605	**239/900 CA/W33**		923	1157	5	0.15	4.5	6.7	4.5
	1280	280	7.5	9860	21350	187	340	1200	**230/900 CA/W33**		928	1252	6	0.20	3.4	5	3.2
	1280	375	7.5	13260	31740	162	289	1570	**240/900 CA/W33**		928	1252	6	0.26	2.6	3.9	2.5
	1420	515	12	20820	45080	119	238	3350	**241/900 CA/W33**		948	1372	10	0.35	1.9	2.9	1.8
950	1250	224	7.5	6670	18032	187	366	755	**239/950 CA/W33**		978	1222	6	0.15	4.5	6.7	4.5
	1360	300	7.5	11000	26220	153	289	1450	**230/950 CA/W33**		978	1332	6	0.20	3.4	5	3.2
	1360	412	7.5	13600	35880	145	255	1990	**240/950 CA/W33**		978	1332	6	0.27	2.5	3.7	2.5
	1500	545	12	22000	20600	111	221	3535	**241/950 CA/W33**		998	1452	10	0.35	1.9	2.9	1.8
1000	1320	315	7.5	9600	26680	145	272	1200	**249/1000CA/W33**		1028	1292	6	0.21	3.2	4.8	3.2
	1420	308	7.5	11700	28060	153	306	1600	**230/1000CA/W33**		1028	1392	6	0.19	3.6	5.3	3.6
	1420	412	7.5	14200	37260	136	238	2140	**240/1000CA/W33**		1028	1392	6	0.26	2.6	3.9	2.5
	1580	462	12	19700	44160	119	238	3500	**231/1000CA/W33**		1048	1532	10	0.28	2.4	3.6	2.5
	1580	580	12	24500	57960	102	204	4300	**241/1000CA/W33**		1048	1532	10	0.35	1.9	2.9	1.8
1060	1400	250	7.5	8700	23920	153	306	1100	**239/1060CA/W33**		1088	1372	6	0.16	4.2	6.3	4
	1500	325	9.5	12700	31280	145	272	2250	**230/1060CA/W33**		1094	1466	8	0.19	3.6	5.3	3.6
	1500	438	9.5	15920	41860	128	221	2515	**240/1060CA/W33**		1094	1466	8	0.26	2.6	3.9	2.5
1120	1460	335	7.5	10760	31740	119	221	1500	**249/1120CA/W33**		1148	1432	6	0.20	3.4	5	3.2
	1580	462	9.5	17200	46000	111	204	2925	**240/1120CA/W33**		1154	1546	8	0.26	2.6	3.9	2.5
1180	1540	272	7.5	10200	28520	128	255	1400	**239/1180CA/W33**		1208	1512	6	0.16	4.2	6.3	4
1250	1750	375	9.5	16500	41400	111	204	2840	**230/1250CA/W33**		1284	1716	8	0.19	3.6	5.3	3.6

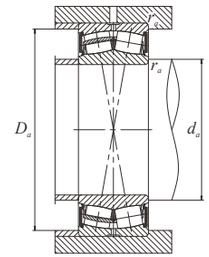




CAC-2RS Type

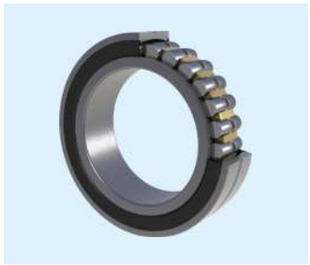


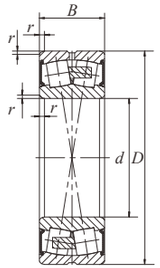
CC-2RS Type



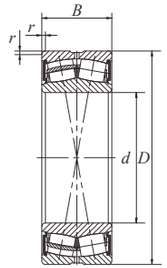
d 25~120mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)	Reference mass (kg) ≈	Nominal numbers	Mounting dimensions(mm)				Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}				d_a Min	d_a Max	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
25	52	23	1	49	44	3580	0.31	**22205X2-2RS**	30	30	46.4	1	0.35	1.9	2.9	1.8
30	62	25	1	64	60	2780	0.34	**22206X2-2RS**	35.6	36	56.4	1	0.31	2.2	3.3	2
35	72	28	1.1	86.5	85	2380	0.52	**22207X2-2RS**	42	43	65	1	0.31	2.2	3.3	2
40	80	28	1.1	96.5	90	2180	0.57	**22208X2-2RS**	47	47	73	1	0.28	2.4	3.6	2.5
45	85	28	1.1	102	98	1980	0.66	**22209X2-2RS**	52	53	78	1	0.26	2.6	3.9	2.5
50	90	28	1.1	104	108	1880	0.70	**22210X2-2RS**	57	58	83	1	0.24	2.8	4.2	2.8
55	100	31	1.5	125	127	1680	1.00	**22211X2-2RS**	64	64	91	1.5	0.24	2.8	4.2	2.8
60	110	34	1.5	156	166	1580	1.30	**22212X2-2RS**	69	69	101	1.5	0.24	2.8	4.2	2.8
65	100	35	1.1	132	173	980	0.95	**24013-2RS/W33**	71	71.5	94	1	0.27	2.5	3.7	2.5
	120	38	1.5	193	216	1480	1.60	**22213X2-2RS**	74	76	111	1.5	0.24	2.8	4.2	2.8
70	125	38	1.5	208	228	1380	1.80	**22214X2-2RS**	79	80	116	1.5	0.23	2.9	4.4	2.8
75	115	40	1.1	173	232	930	1.55	**24015-2RS/W33**	81	81.5	109	1	0.28	2.4	3.6	2.5
	130	38	1.1	212	240	1280	2.10	**22215X2-2RS**	84	84	121	1.5	0.22	3	4.6	2.5
	160	64	2.1	440	475	930	6.54	**22315X2-2RS**	87	88	148	2	0.35	1.9	2.9	1.8
80	140	40	2	236	270	1180	2.40	**22216X2-2RS**	91	91.5	129	2	0.22	3	4.6	2.8
85	150	44	2	285	325	1080	3.00	**22217X2-2RS**	96	98	139	2	0.22	3	4.6	2.8
90	160	48	2	325	375	980	3.70	**22218X2-2RS**	101	102	149	2	0.24	2.8	4.2	2.8
100	150	50	1.5	285	415	780	3.15	**24020-2RS/W33**	107	108	143	1.5	0.28	2.4	3.6	2.5
	165	52	2	365	490	830	4.55	**23120-2RS/W33**	111	112	154	2	0.27	2.5	3.7	2.5
	180	55	2.1	425	490	880	5.50	**22220X2-2RS**	112	114	168	2	0.24	2.8	4.2	2.8
	180	60.3	2.1	475	600	680	6.85	**23220-2RS**	112	114	168	2	0.30	2.3	3.4	2.2
110	170	45	2	310	440	880	3.80	**23022-2RS**	119	122	161	2	0.23	2.9	4.4	2.8
	180	56	2	430	585	780	5.75	**23122-2RS/W33**	121	122	169	2	0.27	2.5	3.7	2.5
	180	69	2	520	750	610	7.10	**24122-2RS/W33**	121	121	169	2	0.35	1.9	2.9	1.8
	200	63	2.1	560	640	780	7.60	**22222X2-2RS/W33**	122	126	188	2	0.25	2.7	4	2.5
120	180	46	2	355	510	830	4.20	**23024-2RS/W33**	129	132	171	2	0.20	3.4	5	3.2
	180	60	2	430	670	650	5.45	**24024-2RS/W33**	129	130	171	2	0.28	2.4	3.6	2.5

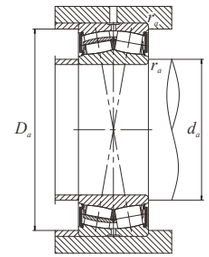




CAC-2RS Type

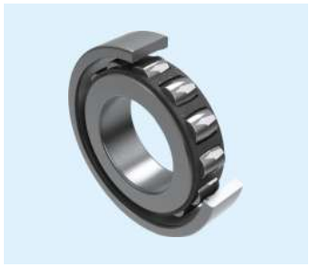


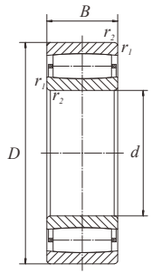
CC-2RS Type



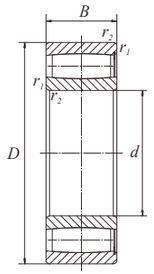
d 130~220mm

Boundary dimensions (mm)			Chamfer (mm)	Basic load ratings (kN)		Limiting speeds (r/min)	Reference mass (kg)	Nominal numbers	Mounting dimensions(mm)				Calculating coefficient			
d	D	B	r(Min)	C_r	C_{0r}		≈		d_a Min	d_a Max	D_a Max	r_a Max	e	Y_1	Y_2	Y_0
	200	80	2	655	950	540	10.5	**24124-2RS/W33**	131	132	189	2	0.37	1.8	2.7	1.8
	215	69	2.1	630	765	730	9.75	**22224X2-2RS**	132	136	203	2	0.26	2.6	3.9	2.5
130	200	52	2	430	610	780	6.00	**23026-2RS/W33**	139	145	191	2	0.21	3.2	4.8	3.2
	200	69	2	540	815	580	8.05	**24026-2RS/W33**	139	140	191	2	0.30	2.3	3.4	2.2
	210	80	2	680	1000	510	11.0	**24126-2RS/W33**	141	141	199	2	0.33	2	3	2
140	210	69	2	570	900	540	8.55	**24028-2RS/W33**	149	151	201	2	0.28	2.4	3.6	2.5
	225	85	2.1	765	1160	430	13.5	**24128-2RS/W33**	152	153	213	2	0.35	1.9	2.9	1.8
150	225	75	2.1	655	1040	510	10.5	**24030-2RS/W33**	161	162	214	2	0.28	2.4	3.6	2.5
	250	100	2.1	1020	1530	380	20.0	**24130-2RS/W33**	162	163	238	2	0.37	1.8	2.7	1.8
160	240	80	2.1	750	1200	430	13.0	**24032-2RS/W33**	171	173	229	2	0.28	2.4	3.6	2.5
	270	86	2.1	980	1370	510	20.5	**23132-2RS/W33**	172	180	258	2	0.28	2.4	3.6	2.5
170	260	90	2.1	930	1460	380	17.5	**24034-2RS/W33**	181	184	249	2	0.30	2.3	3.4	2.2
	280	109	2.1	1220	1860	340	27.5	**24134-2RS/W33**	182	185	268	2	0.37	1.8	2.7	1.8
180	280	100	2.1	1080	1730	360	23.0	**24036-2RS/W33**	191	194	269	2	0.31	2.2	3.3	2.2
190	320	128	3	1600	2500	320	43.0	**24138-2RS/W33**	204	210	306	2.5	0.40	1.7	2.5	1.6
200	340	140	3	1800	2800	300	53.5	**24140-2RS**	214	221	326	2.5	0.40	1.7	2.5	1.6
	360	128	4	1860	2700	410	58.0	**23240-2RS/W33**	217	229	343	3	0.35	1.9	2.9	1.8
220	300	60	2.1	546	1080	580	12.5	**23944-2RS**	231	238	289	2	0.15	4.5	6.7	4.5

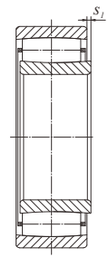




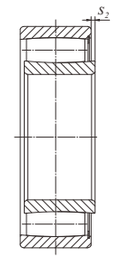
Bearing with cage



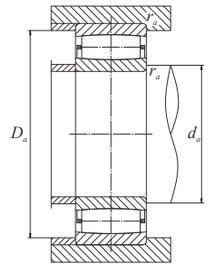
Full complement bearing



Bearing with cage

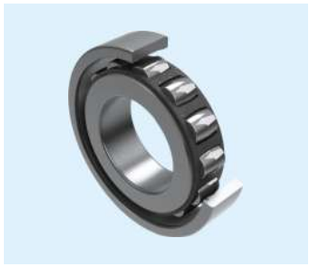


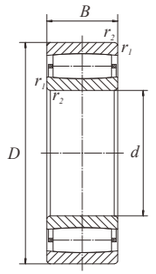
Full complement bearing



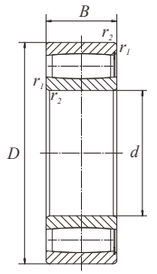
d 25~55mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Mass (kg) ≈	Dimensions (mm)			Nominal numbers		Dimension of shoulder and chamfer					Calculating coefficient	
d	D	B	C_r	C_{0r}	Grease	Oil		$r_{1,2}$	S_1	S_2	Cylindrical bore	Tapered bore	d_a Min	d_a Max	D_a Min	D_a Max	r_a Max	K_1	K_2
25	52	18	40	36	11050	15300	0.17	1	5.8	-	**S 2205 TN**	**S 2205 KTN**	30.6	32	42	46.4	1	0.09	0.126
	52	18	46	44		5950	0.18	1	5.8	2.8	**S 2205 V**	**S 2205 KV**	30.6	39	-	46.4	1	0.09	0.126
30	55	45	123	165		2550	0.50	1	7.9	4.9	**S 6006 V**		35.6	43	-	49.4	1	0.102	0.096
	62	20	63	57	9350	12750	0.27	1	4.5	-	**S 2206 TN**	**S 2206 KTN**	35.6	37	51	56.4	1	0.101	0.111
	62	20	70	65		5100	0.29	1	4.5	1.5	**S 2206 V**	**S 2206 KV**	35.6	49	_	56.4	1	0.101	0.111
35	72	23	76	73	8070	11050	0.43	1.1	5.7	-	**S 2207 TN**	**S 2207 KTN**	42	44	59	65	1	0.094	0.121
	72	23	87	88		4250	0.45	1.1	5.7	2.7	**S 2207 V**	**S 2207 KV**	42	57	-	65	1	0.094	0.121
40	62	22	70	92		3660	0.25	0.6	4.7	1.7	**S 4908 V**	**S 4908 K30V**	43.2	52	-	58.8	0.6	0.099	0.114
	62	30	95	130		2890	0.35	0.6	5	2	**S 5908 V**		43.2	45	-	58.8	0.6	0.096	0.106
	62	40	110	165		2380	0.47	0.6	9.4	6.4	**S 6908 V**		43.2	46	-	58.8	0.6	0.113	0.088
	80	23	80	80	6800	9350	0.50	1.1	7.1	-	**S 2208 TN**	**S 2208 KTN**	47	52	68	73	1	0.093	0.128
	80	23	90	95		3830	0.53	1.1	7.1	4.1	**S 2208 V**	**S 2208 KV**	47	66	-	73	1	0.093	0.128
45	68	22	70	100		3230	0.30	0.6	4.7	1.7	**S 4909 V**	**S 4909 K30V**	48.2	51	-	64.8	0.6	0.114	0.1
	68	30	90	130		2720	0.41	0.6	5	2	**S 5909 V**		48.2	51	-	64.8	0.6	0.096	0.106
	68	40	120	180		2210	0.55	0.6	9.4	6.4	**S 6909 V**		48.2	52	-	64.8	0.6	0.113	0.09
	85	23	80	85	6800	9350	0.55	1.1	7.1	-	**S 2209 TN**	**S 2209 KTN**	52	55	71	78	1	0.095	0.128
	85	23	90	101		3660	0.58	1.1	7.1	4.1	**S 2209 V**	**S 2209 KV**	52	69	-	78	1	0.095	0.128
50	72	22	80	115		3060	0.29	0.6	4.7	1.7	**S 4910 V**	**S 4910 K30V**	53.2	62	-	68.8	0.6	0.103	0.114
	72	30	100	160		2380	0.42	0.6	5	2	**S 5910 V**		53.2	56	-	68.8	0.6	0.096	0.11
	72	40	120	200		1870	0.54	0.6	9.4	6.4	**S 6910 V**		53.2	61	-	68.8	0.6	0.093	0.113
	80	30	108	128	4250	6380	0.55	1	6	-	**S 4010 TN**	**S 4010 K30TN**	54.6	57	69	75.4	1	0.103	0.107
	80	30	120	160		2550	0.59	1	6	3	**S 4010 V**	**S 4010 K30V**	54.6	67	-	75.4	1	0.103	0.107
	90	23	90	92	5950	800	0.59	1.1	7.1	-	**S 2210 TN**	**S 2210 KTN**	57	61	77	83	1	0.097	0.128
	90	23	100	110		3230	0.62	1.1	7.1	3.9	**S 2210 V**	**S 2210 KV**	57	73	-	83	1	0.097	0.128
55	80	25	90	140		2720	0.43	1	5.5	2.5	**S 4911 V**	**S 4911 K30V**	59.6	62	-	80.4	1	0.107	0.105

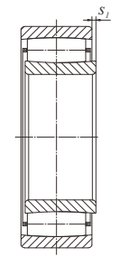




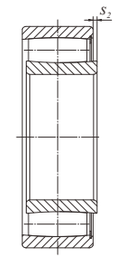
Bearing with cage



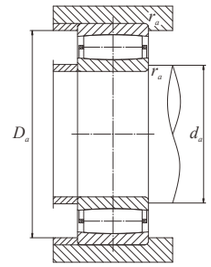
Full complement bearing



Bearing with cage

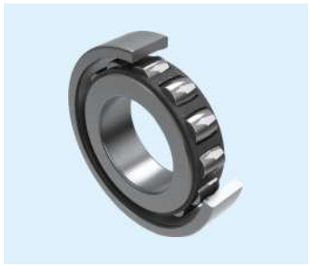


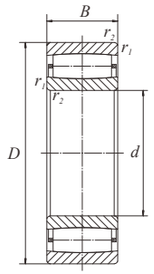
Full complement bearing



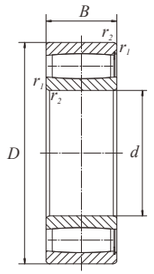
d 60~75mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Mass (kg) ≈	Dimensions (mm)			Nominal numbers		Dimension of shoulder and chamfer					Calculating coefficient	
d	D	B	C_r	C_{0r}	Grease	Oil		$r_{1,2}$	S_1	S_2	Cylindrical bore	Tapered bore	d_a Min	d_a Max	D_a Min	D_a Max	r_a Max	K_1	K_2
	80	34	130	200		2210	0.60	1	6	3	**S 5911 V**		59.6	62	-	80.4	1	0.097	0.109
	80	45	160	270		1700	0.81	1	7.9	4.9	**S 6911 V**		59.6	62	-	80.4	1	0.096	0.105
	100	25	105	104	5700	7650	0.19	1.5	8.6	-	**S 2211 TN**	**S 2211 KTN**	64	65	84	91	1.5	0.094	0.133
	100	25	120	120		2890	0.81	1.5	8.6	5.4	**S 2211 V**	**S 2211 KV**	64	80	-	91	1.5	0.094	0.133
60	85	25	103	150		2550	0.46	1	5.5	2.3	**S 4912 V**	**S 4912 K30V**	64.6	68	-	80.4	1	0.107	0.108
	85	34	130	220		2040	0.64	1	6	2.8	**S 5912 V**		64.6	68	-	80.4	1	0.097	0.11
	85	45	170	300		1620	0.84	1	7.9	4.7	**S 6912 V**		64.6	72	-	80.4	1	0.108	0.096
	110	28	130	140	4760	6380	1.10	1.5	8.5	-	**S 2212 TN**	**S 2212 KTN**	69	77	95	101	1.5	0.1	0.123
	110	28	150	170		2380	1.15	1.5	8.5	5.3	**S 2212 V**	**S 2212 KV**	69	91	-	101	1.5	0.1	0.123
65	90	25	160	160		2380	0.50	1	5.5	2.3	**S 4913 V**	**S 4913 K30V**	69.6	72	-	85.4	1	0.107	0.109
	90	34	140	240		1870	0.70	1	6	2.8	**S 5913 V**		69.6	72	-	85.4	1	0.097	0.111
	90	45	180	330		1530	0.93	1	7.9	4.7	**S 6913 V**		69.6	72	-	85.4	1	0.096	0.107
	100	35	180	280		2040	1.00	1.1	6	2.8	**S 4013 V**	**S 4013 K30V**	71	74		94	1	0.1	0.108
	120	31	165	160	4500	6380	1.40	1.5	9.6	-	**S 2213 TN**	**S 2213 KTN**	74	79	102	111	1.5	0.097	0.127
	130	31	190	200		2040	1.47	1.5	9.6	5.3	**S 2213 V**	**S 2213 KV**	74	79	-	111	1.5	0.097	0.127
70	100	30	150	220		2210	0.78	1	6	2.8	**S 4914 V**	**S 4914 K30V**	74.6	78	-	95.4	1	0.107	0.107
	100	40	180	280		1700	1.00	1	9.4	6.2	**S 5914 V**		74.6	78	-	95.4	1	0.114	0.095
	100	54	240	410		1450	1.40	1	9	5.8	**S 6914 V**		74.6	79	-	95.4	1	0.102	0.1
	125	31	170	180	4250	5950	1.45	1.5	9.6	-	**S 2214 TN**	**S 2214 KTN**	79	83	107	116	1.5	0.098	0.127
	125	31	190	210		2040	1.50	1.5	9.6	5.3	**S 2214 V**	**S 2214 KV**	79	102	-	116	1.5	0.098	0.127
	150	51	370	390	3230	4250	4.25	2.1	9.1	-	**S 2314**	**S 2314 K**	82	105	120	138	2	0.11	0.099
75	105	30	150	230		2040	0.82	1	6	2.8	**S 4915 V**	**S 4915 K30V**	79.6	83	-	100	1	0.107	0.108
	105	40	180	300		1620	1.10	1	9.4	6.2	**S 5915 V**		79.6	89	-	100	1	0.098	0.114
	105	54	180	300		1360	1.40	1	9.2	9.2	**S 6915 V**		79.6	88	-	100	1	0.073	0.154
	115	40	210	310		1700	1.50	1.1	9.4	5.1	**S 4015 V**	**S 4015 K30V**	81	87	-	109	1	0.115	0.097

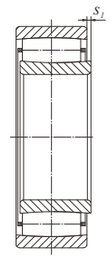




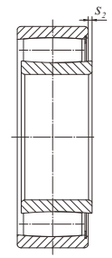
Bearing with cage



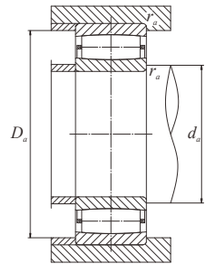
Full complement bearing



Bearing with cage

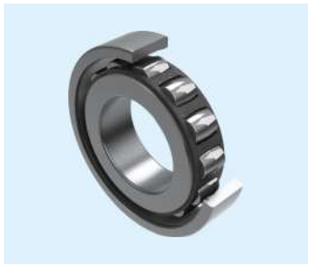


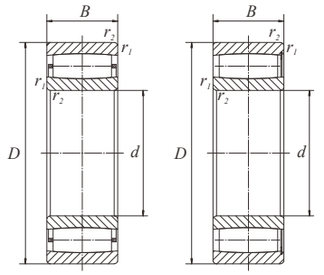
Full complement bearing



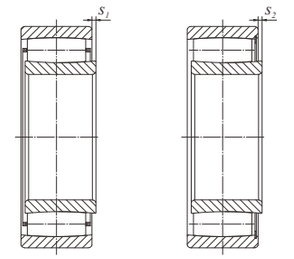
d 80~100mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Mass (kg) ≈	Dimensions (mm)			Nominal numbers		Dimension of shoulder and chamfer					Calculating coefficient	
d	D	B	C_r	C_{0r}	Grease	Oil		$r_{1,2}$	S_1	S_2	Cylindrical bore	Tapered bore	d_a Min	d_a Max	D_a Min	D_a Max	r_a Max	K_1	K_2
	130	31	180	190	4080	5700	1.60	1.5	9.6	-	**S 2215**	**S 2215 K**	84	98	110	121	1.5	0.099	0.127
	130	31	200	220		1870	1.65	1.5	9.6	5.3	**S 2215 V**	**S 2215 KV**	84	105	-	121	1.5	0.099	0.127
	160	55	390	420	3060	4080	5.20	2.1	13.1	-	**S 2315**	**S 2315 K**	87	110	130	148	2	0.103	0.107
80	110	30	160	250		1870	0.87	1	6	1.7	**S 4916 V**	**S 4916 K30V**	84.6	88	-	105	1	0.107	0.11
	110	40	190	310		1530	1.20	1	9.4	5.1	**S 5916 V**		84.6	88	-	105	1	0.114	0.098
	140	33	200	230	3830	5100	2.00	2	9.1	-	**S 2216**	**S 2216 K**	91	105	120	129	2	0.104	0.121
	140	33	230	280		1700	2.10	2	9.1	4.8	**S 2216 V**	**S 2226 KV**	91	115	-	129	2	0.104	0.121
	170	58	470	500	2890	3830	6.20	2.1	10.1	-	**S 2316**	**S 2316 K**	92	115	135	158	2	0.107	0.101
85	120	35	200	320		1700	1.30	1.1	6	1.7	**S 4917 V**	**S 4917 K30V**	91	94	-	114	1	0.1	0.114
	120	46	250	420		1450	1.70	1.1	8.9	4.6	**S 5917 V**		91	95	-	114	1	0.098	0.109
	150	36	250	290	3660	4760	2.60	2	7.1	-	**S 2217**	**S 2217 K**	96	110	125	139	2	0.114	0.105
	150	36	290	350		1530	2.80	2	7.1	1.7	**S 2217 V**	**S 2217 KV**	96	115	-	139	2	0.114	0.105
	180	60	490	550	2720	3660	7.30	3	12.1	-	**S 2317**	**S 2317 K**	99	125	145	166	2.5	0.105	0.105
90	125	35	170	290		1700	1.30	1.1	11	6.7	**S 4918 V**	**S 4918 K30V**	96	100	-	119	1	0.125	0.098
	125	46	206	360		1360	1.75	1.1	15.4	11.1	**S 5918 V**		96	105	-	119	1	0.089	0.131
	150	72	410	610		1280	5.10	2	19.7	19.7	**S2039 V**		101	115	-	139	2	0.087	0.123
	160	40	300	350	3230	4500	3.30	2	9.5	-	**S 2218**	**S 2218 K**	101	120	130	149	2	0.104	0.117
	160	40	330	400		1280	3.40	2	9.5	5.4	**S 2218 V**	**S 2218 KV**	101	125	-	149	2	0.104	0.117
	190	64	560	640	2380	3400	8.50	3	9.6	-	**S 2318**	**S 2318 K**	104	135	155	176	2.5	0.108	0.101
95	170	43	330	360	3230	4250	4.00	2.1	10.5	-	**S 2219**	**S 2219 K**	107	112	149	158	2	0.114	0.104
	200	67	560	640	2380	3400	10.0	3	12.6	-	**S 2319**	**S 2319 K**	109	135	155	186	2.5	0.103	0.106
100	140	40	253	410		1450	1.90	1.1	9.4	5.1	**S 4920 V**	**S 4920 K30V**	106	110	-	134	1	0.115	0.103
	140	54	345	580		1190	2.70	1.1	9	4.7	**S 5920 V**		106	105	-	134	1	0.103	0.105
	150	50	320	480		1190	3.05	1.5	14	9.7	**S 4020 V**	**S 4020 K30V**	109	120	-	141	1.5	0.098	0.118
	150	67	460	790		940	4.30	1.5	9.3	5	**S 5020 V**		109	125	-	141	1.5	0.112	0.094

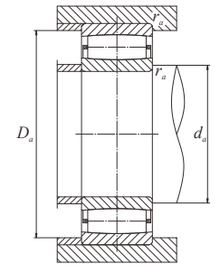




Bearing with cage　　Full complement bearing

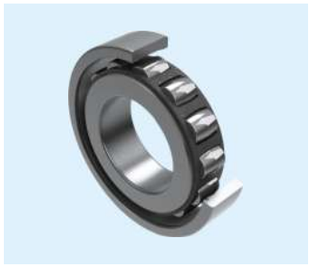


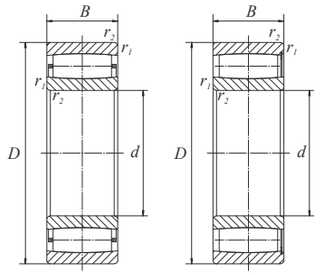
Bearing with cage　　Full complement bearing



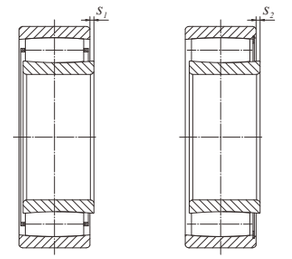
d 110~150mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Mass (kg) ≈	Dimensions (mm)			Nominal numbers		Dimension of shoulder and chamfer					Calculating coefficient	
d	D	B	C_r	C_{0r}	Grease	Oil		$r_{1,2}$	S_1	S_2	Cylindrical bore	Tapered bore	d_a Min	d_a Max	D_a Min	D_a Max	r_a Max	K_1	K_2
	165	52	380	490	2720	3830	4.40	2	10	-	**S 3120**	**S 3120 K**	111	119	150	154	2	0.1	0.112
	165	52	437	600		1100	4.40	2	10	4.7	**S 3120 V**		111	130	-	154	2	0.1	0.112
	165	65	437	600		1100	5.25	2	17.7	17.7	**S 4120 V**	**S 4120 K30V**	111	130	-	154	2	0.09	0.125
	170	65	437	600		1190	5.95	2	17.7	17.7	**S 2034 V**		111	130	-	159	2	0.09	0.125
	180	46	380	420	3060	4080	4.85	2.1	10.1	-	**S 2220**	**S 2220 K**	112	130	150	168	2	0.108	0.11
	215	73	736	810	2210	3060	12.5	3	11.2	-	**S 2320**	**S 2320 K**	114	150	170	201	2.5	0.113	0.103
110	170	45	320	440	2720	3830	3.50	2	9.5	-	**S 3022**	**S 3022 K**	119	127	157	161	2	0.107	0.11
	170	60	460	730		1020	4.05	2	12	6.6	**S 4022 V**	**S 4022 K30V**	119	130	-	161	2	0.111	0.109
	180	69	610	920		770	7.05	2	11.4	4.6	**S 4122 V**	**S 4122 K30V**	120	145	-	170	2	0.111	0.097
	200	53	480	570	2720	3660	6.90	2.1	11.1	-	**S 2222**	**S 2222 K**	122	150	165	188	2	0.113	0.103
120	180	46	345	480	2550	3400	3.90	2	10.6	-	**S 3024**	**S 3024 K**	129	145	160	171	2	0.111	0.109
	180	46	390	580		1190	4.05	2	10.6	3.8	**S 3024 V**	**S 3024 KV**	129	150	-	171	2	0.111	0.106
	180	60	480	800		940	5.50	2	12	5.2	**S 4024 V**	**S 4024 K30V**	129	150	-	171	2	0.109	0.103
	200	80	710	1030		640	10.5	2	18	11.2	**S 4124 V**	**S 4124 K30V**	131	140	-	189	2	0.103	0.103
	215	58	560	650	2550	3400	8.60	2.1	13	-	**S 2224**	**S 2224 K**	132	143	192	203	2	0.113	0.103
	215	76	690	900	2040	2720	11.5	2.1	17.1	-	**S 3224**	**S 3224 K**	132	160	180	203	2	0.103	0.108
130	200	52	350	530	2380	3230	5.90	2	16.5	-	**S 3026**	**S 3026 K**	139	152	182	191	2	0.123	0.1
	200	69	570	850	1620	2380	7.84	2	11.4	-	**S 4026**	**S 4026 K30**	139	155	175	191	2	0.113	0.097
	200	69	660	1030		720	8.05	2	11.4	4.6	**S 4026 V**	**S 4026 K30V**	139	165	-	191	2	0.113	0.097
	210	80	690	1010		570	10.5	2	9.7	9.7	**S 4126 V**	**S 4126 K30V**	141	170	-	199	2	0.09	0.126
	230	64	670	855	2380	3230	11.00	3	9.6	-	**S 2226**	**S 2226 K**	144	170	185	216	2.5	0.113	0.101
140	210	53	450	670	2210	2890	6.30	2	11	-	**S 3028**	**S 3028 K**	149	161	195	201	2	0.102	0.116
	210	69	690	1120		680	8.55	2	11.4	5.9	**S 4028 V**	**S 4028 K30V**	149	175	-	201	2	0.115	0.097
	225	85	920	1470		540	14.20	2.1	12	5.2	**S 4128 V**	**S 4128 K30V**	151	185	-	214	2	0.111	0.097
150	225	56	490	780	2040	2720	8.30	2.1	2.8	-	**S 3030 M**	**S 3030 KM**	161	172	200	214	2	0.108	

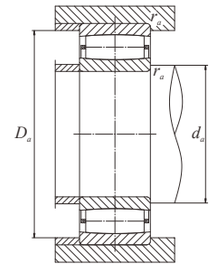




Bearing with cage　　Full complement bearing

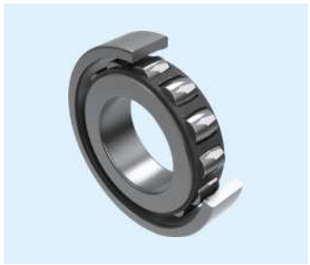


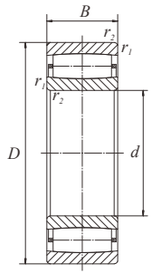
Bearing with cage　　Full complement bearing



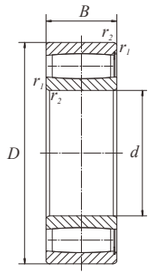
d 160~190mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Mass (kg) ≈	Dimensions (mm)			Nominal numbers		Dimension of shoulder and chamfer					Calculating coefficient	
d	D	B	C_r	C_{0r}	Grease	Oil		$r_{1,2}$	S_1	S_2	Cylindrical bore	Tapered bore	d_a Min	d_a Max	D_a Min	D_a Max	r_a Max	K_1	K_2
	225	75	710	1210		640	10.50	2.1	17.4	10.6	**S 4030 V**	**S 4030 K30V**	161	185	-	214	2	0.107	0.106
	250	80	810	1180	1700	2380	15.00	2.1	13.9	-	**S 3130**	**S 3130 K**	162	195	215	238	2	0.12	0.092
	250	100	1120	1710		380	20.50	2.1	20	10.1	**S 4130 V**	**S 4130 K30V**	162	175	-	228	2	0.103	0.103
	270	73	900	1120	2040	2720	17.50	3	11.2	-	**S 2230**	**S 2230 K**	164	200	215	256	2.5	0.119	0.096
160	240	60	550	900	1870	2550	9.60	2.1	15	-	**S 3032**	**S 3032 K**	171	186	220	229	2	0.115	0.106
	240	80	730	1060	1360	2040	12.3	2.1	18.1	-	**S 4032**	**S 4032 K30**	171	190	210	229	2	0.109	0.103
	240	80	840	1340		510	12.6	2.1	18.1	8.2	**S 4032 V**	**S 4032 K30V**	171	195	-	229	2	0.109	0.103
	270	86	920	1280	1700	2210	20.0	2.1	19	-	**S 3132**	**S 3132 K**	172	190	242	258	2	0.099	0.111
	270	109	1340	1980		260	26.0	2.1	21	11.1	**S 4132 V**	**S 4132 K30V**	172	190	-	258	2	0.101	0.105
	290	104	1260	1680	1450	2040	28.5	3	19.3	-	**S 3232**	**S 3232 K**	174	215	245	276	2.5	0.112	0.096
170	260	67	690	1060	1700	2380	12.5	2.1	12.5	-	**S 3034**	**S 3034 K**	181	200	238	249	2	0.105	0.112
	260	90	1040	1710		400	17.5	2.1	17.1	7.2	**S 4034 V**	**S 4034 K30V**	181	215	-	249	2	0.108	0.103
	280	88	950	1340	1620	2210	21.0	2.1	21	-	**S 3134**	**S 3134 K**	182	200	250	268	2	0.101	0.109
	280	109	1400	2090		240	27.0	2.1	21	11.1	**S 4134 V**	**S 4134 K30V**	182	200	-	268	2	0.101	0.106
	310	86	1160	1500	1700	2210	28.0	4	16.4	-	**S 2234**	**S 2234 K**	187	230	225	293	3	0.114	0.1
180	280	74	810	1230	1620	2210	16.5	2.1	15.1	-	**S 3036**	**S 3036 K**	191	220	240	269	2	0.112	0.105
	280	100	1210	1950		370	23.0	2.1	20.1	10.2	**S 4036 V**	**S 4036 K30V**	191	225	-	269	2	0.107	0.103
	300	96	1150	1590	1530	2040	26.0	3	23.2	-	**S 3136**	**S 3136 K**	194	230	255	286	2.5	0.102	0.111
	300	118	1620	2480		190	34.5	3	20	10.1	**S 4136 V**	**S 4136 K30V**	194	210	-	286	2.5	0.095	0.11
	320	112	1400	2020	1280	1700	37.0	4	27.3	-	**S 3236**	**S 3236 K**	197	245	275	303	3	0.107	0.104
190	290	75	850	1340	1530	2040	17.5	2.1	16.1	-	**S 3038**	**S 3038 K**	201	235	255	279	2	0.113	0.107
	290	100	1260	2130		320	24.5	2.1	20	10.1	**S 4038 V**	**S 4038 K30V**	201	220	-	279	2	0.103	0.106
	320	104	1400	2020	1360	1870	33.5	3	19	-	**S 3138**	**S 3138 K**	204	227	290	306	2.5	0.096	0.113
	320	128	1870	2890		110	43.0	3	20	10.1	**S 4138 V**	**S 4138 K30V**	204	220	-	306	2.5	0.094	0.111
	340	92	1260	1590	1530	2040	34.0	4	22.5		**S 2238**	**S 2238 K**	207	250	275	323	3	0.108	0.108

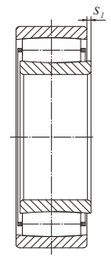




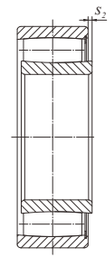
Bearing with cage



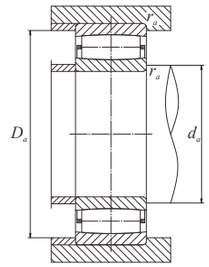
Full complement bearing



Bearing with cage

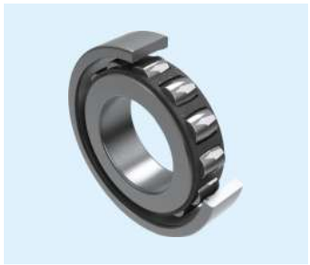


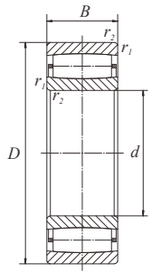
Full complement bearing



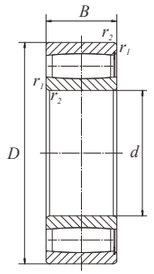
d 200~380mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Mass (kg) ≈	Dimensions (mm)			Nominal numbers		Dimension of shoulder and chamfer					Calculating coefficient	
d	D	B	C_r	C_{0r}	Grease	Oil		$r_{1,2}$	S_1	S_2	Cylindrical bore	Tapered bore	d_a Min	d_a Max	D_a Min	D_a Max	r_a Max	K_1	K_2
200	310	82	1030	1590	1450	2040	22.0	2.1	15.2		**S 3040**	**S 3040 K**	211	250	275	299	2	0.123	0.095
	310	109	1500	2430		220	30.5	2.1	21	11.5	**S 4040 V**	**S 4040 K30V**	211	225	-	299	2	0.101	0.108
	340	112	1470	2130	1280	1700	40.0	3	27.3		**S 3140**	**S 3140 K**	214	260	307	326	2.5	0.108	0.104
	340	140	2170	3350		70	54.0	3	22	12.1	**S 4140 V**	**S 4140 K30V**	214	235	-	326	2.5	0.092	0.112
220	340	90	1210	1870	1360	1870	29.0	3	17.2		**S 3044**	**S 3044 K**	233	270	295	327	2.5	0.114	0.104
	340	118	1770	2990		170	40.0	3	20	10.1	**S 4044 V**	**S 4044 K30V**	233	250	-	327	2.5	0.095	0.113
	370	120	1740	2660	1190	1620	51.0	4	22.3		**S 3144**	**S 3144 K**	237	290	315	351	3	0.114	0.097
	400	108	1840	2300	1280	1700	56.5	4	20.5		**S 2244**	**S 2244 K**	237	295	320	383	3	0.113	0.101
240	360	92	1230	1980	1100	1530	31.5	3	19.2		**S 3048**	**S 3048 K**	253	290	315	347	2.5	0.113	0.106
	400	128	2130	3170	1100	1450	63.0	3	20.4		**S 3148**	**S 3148 K**	257	305	335	383	3	0.116	0.095
260	400	104	1620	2622	1100	1530	46.0	4	19.3		**S 3052**	**S 3052 K**	275	325	350	385	3	0.122	0.096
	440	144	2430	3720	940	1280	87.0	4	26.4		**S 3152**	**S 3152 K**	277	340	375	423	3	0.115	0.096
280	420	106	1710	2850	1020	1360	50.0	4	21.3		**S 3056**	**S 3056 K**	295	350	375	405	3	0.121	0.098
	460	146	2620	4140	940	1190	93.0	5	28.4		**S 3156**	**S 3156 K**	300	360	395	440	4	0.115	0.097
300	460	118	1980	3450	940	1280	71.0	4	20		**S 3060 M**	**S 3060 KM**	315	375	405	445	3	0.123	0.095
	460	160	2660	4500	720	1020	95.0	4	30.4		**S 4060 M**		315	360	400	445	3	0.105	0.106
	500	160	2990	4780	850	1100	120.0	5	30.5		**S 3160**	**S 3160 K**	320	390	425	480	4	0.106	0.106
320	480	121	2090	3680	850	1190	76.5	4	23.3		**S 3064 M**	**S 3064 KM**	335	395	430	465	3	0.121	0.098
	540	176	3810	5790	810	1100	160.0	5	26.7		**S 3164 M**	**S 3164 KM**	340	410	455	520	4	0.114	0.096
340	520	133	2660	4600	810	1100	100	5	25.4		**S 3068 M**	**S 3068 KM**	358	430	465	502	4	0.12	0.099
	580	190	4500	6900	720	1020	205	5	25.9		**S 3168 M**	**S 3168 KM**	360	445	490	560	4	0.118	0.093
360	480	90	1620	2990	850	1190	44	3	17.2		**S 3972 M**	**S 3972 KM**	373	405	440	467	2.5	0.127	0.104
	540	134	2660	4600	770	1020	105	5	26.4		**S 3072 M**	**S 3072 KM**	378	445	480	522	4	0.12	0.099
	600	192	4600	7360	680	940	215	5	27.9		**S 3172 M**	**S 3172 KM**	380	460	510	522	4	0.117	0.094
380	520	106	1950	3680	810	1100	65.5	4	10		**S 3976 M**	**S 3976 KM**	395	425	490	505	3	0.128	

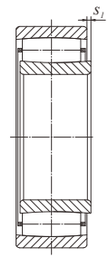




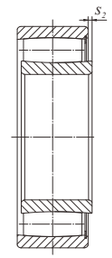
Bearing with cage



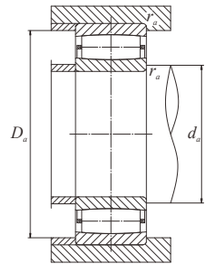
Full complement bearing



Bearing with cage

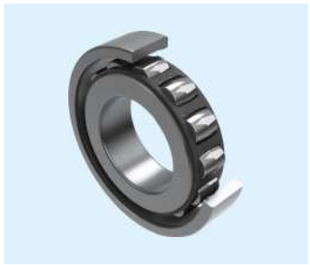


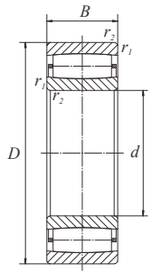
Full complement bearing



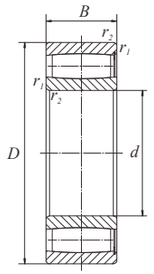
d 400~530mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Mass (kg) ≈	Dimensions (mm)			Nominal numbers		Dimension of shoulder and chamfer					Calculating coefficient	
d	D	B	C_r	C_{0r}	Grease	Oil		$r_{1,2}$	S_1	S_2	Cylindrical bore	Tapered bore	d_a Min	d_a Max	D_a Min	D_a Max	r_a Max	K_1	K_2
	560	135	2760	4780	770	1020	110	5	27		**S 3076 M**	**S 3076 KM**	398	460	495	542	4	0.12	0.1
	620	194	4180	6900	640	850	230	5	19		**S 3176 M**	**S 3176 KM**	400	445	555	600	4	0.106	
400	540	106	1980	3818	770	1105	69	4	10		**S 3980 M**	**S 3980 KM**	415	435	505	525	3	0.128	
	600	148	3350	5700	680	940	140	5	30.6		**S 3080 M**	**S 3080 KM**	418	480	525	582	4	0.121	0.099
	650	200	4600	7950	600	810	275	6	10.1		**S 3180 M**	**S 3180 KM**	426	480	565	624	5	0.109	
420	560	106	1980	3910	720	1020	71	4	21.3		**S 3984 M**	**S 3984 KM**	435	480	515	545	3	0.132	0.098
	620	150	3490	5880	680	940	150	5	32.6		**S 3084 M**	**S 3084 KM**	438	510	550	602	4	0.12	0.1
	700	224	5520	9560	570	770	340	6	34.8		**S 3184 M**	**S 3184 KM**	446	540	595	674	5	0.113	0.098
440	600	118	2530	4870	680	940	98	4	11		**S 3988 M**	**S 3988 KM**	455	490	565	585	3	0.119	
	650	157	3450	5880	640	850	185	6	19.7		**S 3088 M**	**S 3088 KM**	463	490	565	627	5	0.105	
	720	226	5240	8550	570	770	360	6	22		**S 3188 M**	**S 3188 KM**	466	510	635	694	5	0.102	
460	620	118	2480	4870	680	940	100	4	11		**S 3992 M**	**S 3992 KM**	475	505	580	605	3	0.12	
	680	163	3680	6900	600	810	200	6	33.5		**S 3092 M**	**S 3092 KM**	486	565	605	654	5	0.114	0.108
	760	240	6250	11040	510	680	430	7.5	51		**S 3192 M**	**S 3192 KM**	492	570	655	725	6	0.108	0.105
	760	300	7630	13150	440	540	535	7.5	46.2		**S 4192 M**	**S 4192 KM**	492	570	655	725	6	0.111	0.097
480	650	128	2850	5610	640	850	120	5	20.4		**S 3996 M**	**S 3996 KM**	498	550	590	632	4	0.133	0.095
	700	165	3720	7170	570	770	210	6	35.5		**S 3096 M**	**S 3096 KM**	503	580	625	677	5	0.113	0.11
	790	248	6390	11500	480	640	490	7.5	24		**S 3196 M**	**S 3196 KM**	512	580	705	758	6	0.104	
500	670	128	2890	5790	600	810	125	5	20.4		**S 39/500 M**	**S 39/500 KM**	518	580	615	652	4	0.135	0.095
	720	167	3910	7630	530	770	225	6	37.5		**S 30/500 M**	**S 30/500 KM**	523	600	640	697	5	0.113	0.11
	830	264	6900	11680	450	640	550	7.5	75.3		**S 31/500 M**	**S 31/500 K30M**	532	655	705	798	6	0.099	0.116
	830	325	9010	16190	340	480	720	7.5	16.3		**S 41/500 M**	**S 41/500 KM**	532	595	705	798	6	0.093	
530	710	136	3260	6530	570	770	150	5	28.4		**S 39/530 M**	**S 39/530 KM**	548	600	640	692	4	0.129	0.101
	780	185	4690	8740	510	680	295	6	35.7		**S 30/530 M**	**S 30/530 KM**	553	635	685	757	5	0.12	0.101
	870	272	8090	14350	430	570	630	7.5	44.4		**S 31/530 M**	**S 31/530 KM**	562	680	745	838	6	0.115	0.097

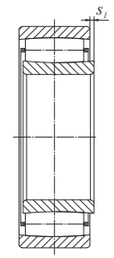




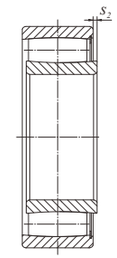
Bearing with cage



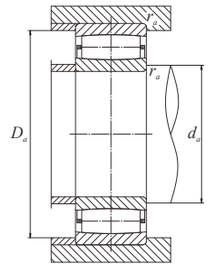
Full complement bearing



Bearing with cage

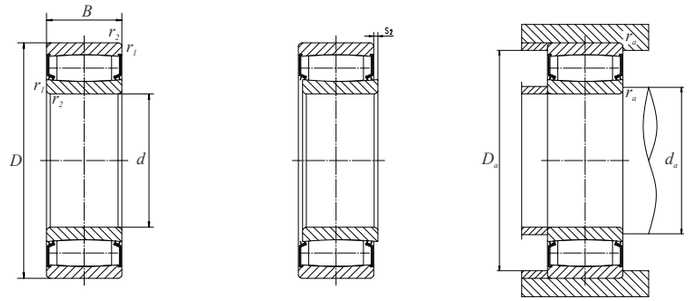


Full complement bearing



d 560~630mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Mass (kg) ≈	Dimensions (mm)			Nominal numbers		Dimension of shoulder and chamfer					Calculating coefficient	
d	D	B	C_r	C_{0r}	Grease	Oil		$r_{1,2}$	S_1	S_2	Cylindrical bore	Tapered bore	d_a Min	d_a Max	D_a Min	D_a Max	r_a Max	K_1	K_2
560	750	140	3310	6760	450	720	170	5	32.4		**S 39/560 M**	**S 39/560 KM**	578	645	685	732	4	0.128	0.104
	820	195	5150	10120	450	640	345	6	45.7		**S 30/560 M**	**S 30/560 KM**	583	695	740	793	5	0.116	0.106
	920	280	8740	15640	410	570	750	7.5	28		**S 31/560 M**	**S 31/560 KM**	592	660	810	888	6	0.111	
600	800	150	3680	8090	480	640	210	5	32.4		**S 39/600 M**	**S 39/600 KM**	618	685	725	782	4	0.131	0.1
	870	200	5790	11220	430	600	390	6	35.9		**S 30/600 M**	**S 30/600 KM**	623	725	775	847	5	0.125	0.098
	980	300	9380	16560	370	510	870	7.5	30		**S 31/600 M**	**S 31/600 KM**	632	705	875	948	6	0.105	
630	850	165	4270	9200	450	600	270	6	35.5		**S 39/630 M**	**S 39/630 KM**	653	720	770	827	5	0.121	0.11
	920	212	6250	11860	410	600	465	7.5	48.1		**S 30/630 M**	**S 30/630 KM**	658	775	810	892	6	0.118	0.104
	1030	315	11220	20240	340	480	1040	7.5	31		**S 31/630 M**	**S 31/630 KM**	662	745	920	998	6	0.109	



d 50~200mm

Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)	Mass (kg) ≈	Dimensions (mm)		Nominal numbers		Dimension of shoulder and chamfer				Calculating coefficient	
d	D	B	C_r	C_{0r}			$r_{1,2}$	S_2	Cylindrical bore	Tapered bore	d_a Min	D_a Min	D_a Max	r_a Max	K_1	K_2
50	72	40	120	200	170	0.56	0.6	2.8	**S 6910-2RSV**		53.2	57	68.8	0.6	0.113	0.091
60	85	45	130	220	144	0.83	1	5.4	**S 6912-2RSV**		64.6	67	80.4	1	0.128	0.083
65	100	35	930	160	120	1.1	1.1	5.9	**S 4013-2RSV**		71	78	94	1	0.071	0.181
75	105	54	180	300	120	1.4	1	7.1	**S 6915-2RSV**		79.6	83	100	1	0.073	0.154
	115	40	130	170	110	1.4	1.1	7.3	**S 4015-2RSV**		81	88	111	1	0.210	0.063
90	125	46	200	360	93	1.75	1.1	4.5	**S 5918-2RSV**		96	101	119	1	0.089	0.131
100	150	50	280	410	80	2.9	1.5	6.2	**S 4020-2RSV**		107	113	143	1.5	0.145	0.083
	165	65	430	600	76	5.2	2	7.3	**S 4120-2RSV**		111	119	154	2	0.09	0.125
110	170	60	380	530	72	4.6	2	7.9	**S 4022-2RSV**		119	127	161	2	0.142	0.083
	180	69	460	650	72	6.6	2	8.2	**S 4122-2RSV**		121	129	169	2	0.086	0.133
120	180	60	390	580	68	5.1	2	7.5	**S 4024-2RSV**		129	139	171	2	0.085	0.142
	200	80	650	920	63	9.7	2	8.2	**S 4124-2RSV**		131	129	169	2	0.126	0.087
130	200	69	500	760	59	7.5	2	8.2	**S 4026-2RSV**		139	151	191	2	0.089	0.133
	210	80	690	1010	59	10.5	2	7.5	**S 4126-2RSV**		141	152	199	2	0.09	0.126
140	210	69	520	820	56	7.9	2	8.7	**S 4028-2RSV**		149	162	201	2	0.133	0.089
	225	85	710	1100	53	12.5	2.1	8.9	**S 4128-2RSV**		152	166	213	2	0.086	0.134
150	225	75	530	880	53	10.0	2.1	10.8	**S 4030-2RSV**		161	174	214	2	0.084	0.144
	250	100	1120	1710	51	20.5	2.1	6.4	**S 4130-2RSV**		162	178	238	2	0.103	0.103
160	240	80	600	1010	51	12.0	2.1	11.4	**S 4032-2RSV**		170	187	230	2	0.154	0.079
	270	109	1340	1980	45	26.0	2.1	6.7	**S 4132-2RSV**		172	189	258	2	0.101	0.105
170	260	90	880	1500	45	17.0	2.1	9	**S 4034-2RSV**		180	199	250	2	0.116	0.097
	280	109	1400	2090	45	27.0	2.1	6.7	**S 4134-2RSV**		182	198	268	2	0.101	0.106
180	280	100	1210	1950	45	23.5	2.1	6.4	**S 4036-2RSV**		190	202	270	2	0.103	0.105
	300	118	1619.2	2480	40	35.0	3	6.4	**S 4136-2RSV**		194	209	286	2.5	0.095	0.11
190	290	100	1260	2130	40	24.5	2.1	6.4	**S 4038-2RSV**		200	219	280	2	0.103	0.106
	320	128	1870	2890	38	43.5	3	6.4	**S 4138-2RSV**		204	220	306	2.5	0.094	0.111
200	310	109	1500	2430	38	31.0	2.1	6.7	**S 4040-2RSV**		210	227	300	2	0.101	0.108
	340	140	2170	3350	36	54.5	3	7	**S 4140-2RSV**		214	235	326	2.5	0.092	0.112

Thrust ball bearing

Thrust ball bearing

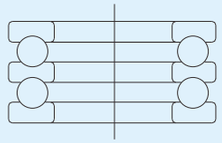
Thrust ball bearing

Thrust ball bearings are separated bearings,with contact angle of 90°. It can only bear axial load and limit speed is low.

1. Main structure

(1) Single direction thrust ball bearing 51000 type
This type of bearings can only bear the axial load from one direction, and it can limit the displacement of shaft and housing in single direction.
(2) Double direction thrust ball bearing 52000 type
This type of bearings can bear the axial load from two directions, and can limit the axial displacement of shaft and housing in two directions.

Single direction thrust ball bearing



Double direction thrust ball bearing

2. Cage material

When the outer diameter is less than 250mm, generally steel sheet (or metal strip) is used; when outer diameter is greater than 250mm, solid cage is usually used. See the following table for details.

Bearing series	Molded cage	Pressed cage	Machined cage
511	51100~51106	51107~51152	51156~511/530
512	——	51200~51224	51226~51260
513	——	51305~51320	51322~51340
514	——	51405~51415	51416~51420
522	——	52202~52224	52226, 52228
523	——	52305~52320	52322, 52324
524	——	52405~52415	52416~52426

3. Minimum axial load

When the thrust ball bearing is in operation, if the bearing is not tightly pressed due to too small axial load, the steel balls will generate slippage and thus damage the normal running of bearings due to the inertia force thereof. Therefore, certain axial load must be applied to the bearing during operation.

4. Allowable misalignment angle

The two supporting surfaces of thrust ball bearings must be parallel and no deviation is allowed. The shaft axis must be vertical to the housing supporting surface. If this cannot be guaranteed, spherical seat washer and aligning washer may be adopted to compensate. In case of any question, please contact C&U.

5. Tolerance

See more details in Section 5 for the tolerances of thrust ball bearings.

6. Dynamic equivalent axial load

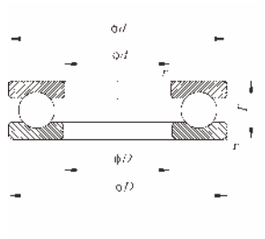
Thrust ball bearing can only take axial load and its axial direction dynamic equivalent load is:

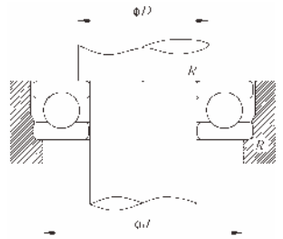
$P_a=F_a$

7. Static equivalent axial load

The axial direction static equivalent load of thrust ball bearing is:

$P_{0a}=F_a$

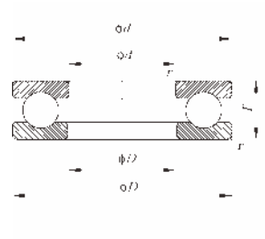


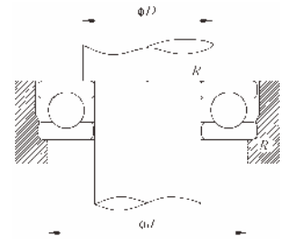


d 10~45 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Dimensions (mm)		Mounting dimensions(mm)			Reference mass (kg)
d	D	T	r[1] (Min)	C_a	C_{0a}	Grease	Oil		$d_{1s\,max}$[2]	$D_{1s\,min}$[3]	D_S Max	d_h Max	R Max	
10	24	9	0.3	10.0	14.0	6,700	9,500	**51100**	24	11	18	16	0.3	0.022
	26	11	0.6	12.7	17.1	5,800	8,300	**51200**	26	12	20	16	0.6	0.030
12	26	9	0.3	10.3	15.4	6,400	9,200	**51101**	26	13	20	18	0.3	0.023
	28	11	0.6	13.2	19.0	5,600	8,000	**51201**	28	14	22	18	0.6	0.035
15	28	9	0.3	10.5	16.8	6,200	8,800	**51102**	28	16	23	20	0.3	0.024
	32	12	0.6	16.6	24.8	5,000	7,100	**51202**	32	17	25	22	0.6	0.046
17	30	9	0.3	10.8	18.2	6,000	8,500	**51103**	30	18	25	22	0.3	0.026
	35	12	0.6	17.2	27.3	4,800	6,800	**51203**	35	19	28	24	0.6	0.053
20	35	10	0.3	14.2	24.7	5,200	7,500	**51104**	35	21	29	26	0.3	0.040
	40	14	0.6	22.3	37.5	4,100	5,900	**51204**	40	22	32	28	0.6	0.080
25	42	11	0.6	19.6	37.0	4,600	6,500	**51105**	42	26	35	32	0.6	0.060
	47	15	0.6	27.8	50.5	3,700	5,300	**51205**	47	27	38	34	0.6	0.112
	52	18	1.0	35.5	61.5	3,200	4,600	**51305**	52	27	41	36	1.0	0.177
	60	24	1.0	55.5	89.5	2,600	3,700	**51405**	60	27	46	39	1.0	0.330
30	47	11	0.6	20.4	42.0	4,300	6,200	**51106**	47	32	40	37	0.6	0.070
	52	16	0.6	29.3	58.0	3,400	4,900	**51206**	52	32	43	39	0.6	0.140
	60	21	1.0	43.0	78.5	2,800	3,900	**51306**	60	32	48	42	1.0	0.270
	70	28	1.0	72.5	126.0	2,200	3,200	**51406**	70	32	54	46	1.0	0.516
35	52	12	0.6	20.4	44.5	3,900	5,600	**51107**	52	37	45	42	0.6	0.084
	62	18	1.0	39.0	78.0	2,900	4,200	**51207**	62	37	51	46	1.0	0.216
	68	24	1.0	55.5	105.0	2,400	3,500	**51307**	68	37	55	48	1.0	0.383
	80	32	1.1	87.0	155.0	1,900	2,800	**51407**	80	37	62	53	1.0	0.759
40	60	13	0.6	26.9	63.0	3,500	5,000	**51108**	60	42	52	48	0.6	0.124
	68	19	1.0	47.0	98.5	2,700	3,900	**51208**	68	42	57	51	1.0	0.277
	78	26	1.0	69.0	135.0	2,200	3,100	**51308**	78	42	63	55	1.0	0.549
	90	36	1.1	112.0	205.0	1,700	2,500	**51408**	90	42	70	60	1.0	1.082
45	65	14	0.6	27.9	69.0	3,200	4,600	**51109**	65	47	57	53	0.6	0.150
	73	20	1.0	48.0	105.0	2,600	3,700	**51209**	73	47	62	56	1.0	0.318
	85	28	1.0	80.0	163.0	2,000	2,900	**51309**	85	47	69	61	1.0	0.683
	100	39	1.1	130.0	242.0	1,600	2,200	**51409**	100	47	78	67	1.0	1.432

Note: 1) is the minimal permitted dimension of chamfer "r".
2) is the maximal permitted dimension of shaft washer outer diameter "d_1".
3) is the minimal permitted dimension of housing washer internal bore dimension "D_1".

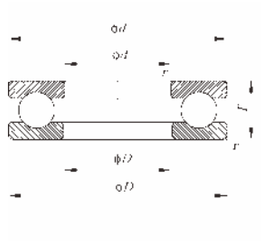


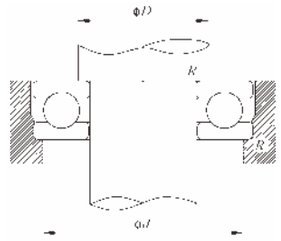


d 50~85 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Dimensions (mm)		Mounting dimensions(mm)			Reference mass (kg)
d	D	T	r[1] (Min)	C_a	C_{0a}	Grease	Oil		$d_{1s\,max}$[2]	$D_{1s\,min}$[3]	D_S Max	d_h Max	R Max	
50	70	14	0.6	28.8	75.5	3,100	4,500	**51110**	70	52	62	58	0.6	0.160
	78	22	1.0	48.5	111.0	2,400	3,400	**51210**	78	52	67	61	1.0	0.378
	95	31	1.1	96.5	202.0	1,800	2,600	**51310**	95	52	77	68	1.0	0.952
	110	43	1.5	158.0	310.0	1,400	2,000	**51410**	110	52	86	74	1.5	1.901
55	78	16	0.6	35.0	93.0	2,800	4,000	**51111**	78	57	69	64	0.6	0.225
	90	25	1.0	69.5	159.0	2,100	3,000	**51211**	90	57	76	69	1.0	0.608
	105	35	1.1	119.0	246.0	1,600	2,300	**51311**	105	57	85	75	1.0	1.293
	120	48	1.5	178.0	360.0	1,300	1,800	**51411**	120	57	94	81	1.5	2.530
60	85	17	1.0	41.5	113.0	2,600	3,700	**51112**	85	62	75	70	1.0	0.299
	95	26	1.0	73.5	179.0	2,000	2,800	**51212**	95	62	81	74	1.0	0.671
	110	35	1.1	123.0	267.0	1,600	2,300	**51312**	110	62	90	80	1.0	1.375
	130	51	1.5	214.0	435.0	1,200	1,700	**51412**	130	62	102	88	1.5	3.125
65	90	18	1.0	41.5	117.0	2,400	3,500	**51113**	90	67	80	75	1.0	0.340
	100	27	1.0	75.0	189.0	1,900	2,700	**51213**	100	67	86	79	1.0	0.770
	115	36	1.1	128.0	287.0	1,500	2,200	**51313**	115	67	95	85	1.0	1.521
	140	56	2.0	232.0	495.0	1,100	1,600	**51413**	140	68	110	95	2.0	3.955
70	95	18	1.0	43.0	127.0	2,400	3,400	**51114**	95	72	85	80	1.0	0.360
	105	27	1.0	76.0	199.0	1,800	2,600	**51214**	105	72	91	84	1.0	0.798
	125	40	1.1	148.0	340.0	1,400	2,000	**51314**	125	72	103	92	1.0	2.015
	150	60	2.0	250.0	555.0	1,000	1,500	**51414**	150	73	118	102	2.0	4.865
75	100	19	1.0	44.5	136.0	2,200	3,200	**51115**	100	77	90	85	1.0	0.405
	110	27	1.0	77.5	209.0	1,800	2,600	**51215**	110	77	96	89	1.0	0.873
	135	44	1.5	171.0	395.0	1,300	1,800	**51315**	135	77	111	99	1.5	2.616
	160	65	2.0	269.0	615.0	940	1,400	**51415**	160	78	125	110	2.0	5.981
80	105	19	1.0	44.5	141.0	2,200	3,100	**51116**	105	82	95	90	1.0	0.425
	115	28	1.0	78.5	218.0	1,700	2,400	**51216**	115	82	101	94	1.0	0.918
	140	44	1.5	176.0	425.0	1,200	1,800	**51316**	140	82	116	104	1.5	2.715
	170	68	2.1	270.0	620.0	890	1,300	**51416**	170	83	133	117	2.0	7.768
85	110	19	1.0	46.0	150.0	2,100	3,000	**51117**	110	87	100	95	1.0	0.443
	125	31	1.0	95.5	264.0	1,600	2,200	**51217**	125	88	109	101	1.0	1.248
	150	49	1.5	201.0	490.0	1,100	1,600	**51317**	150	88	124	111	1.5	3.517
	180	72	2.1	288.0	685.0	840	1,200	***51417**	177	88	141	124	2.0	9.166

Remarks: Part number starting with the sign * represents its shaft washer outside diameter is smaller than housing washer outside diameter. Therefore, when using this type of bearings, the shape of the housing bore does not need to be the same as that shown in the Fig. If there is a withdrawal groove at the outer diameter of the inner ring, the housing can be made into cylindrical shape directly.

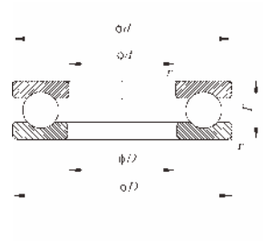


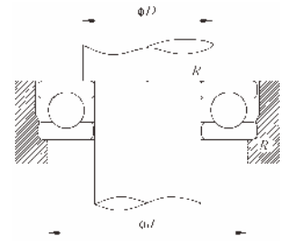


d 90~170 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Dimensions (mm)		Mounting dimensions(mm)			Reference mass (kg)
d	D	T	r[1] (Min)	C_a	C_{0a}	Grease	Oil		$d_{1s\,max}$[2]	$D_{1s\,min}$[3]	D_s Max	d_h Max	R Max	
90	120	22	1.0	59.5	190.0	1,900	2,700	**51118**	120	92	108	102	1.0	0.680
	135	35	1.1	117.0	325.0	1,400	2,000	**51218**	135	93	117	108	1.0	1.702
	155	50	1.5	198.0	490.0	1,100	1,600	**51318**	155	93	129	116	1.5	3.732
	190	77	2.1	305.0	750.0	790	1,100	***51418**	187	93	149	131	2.0	11.01
100	135	25	1.0	85.0	268.0	1,700	2,400	**51120**	135	102	121	114	1.0	0.986
	150	38	1.1	147.0	410.0	1,300	1,800	**51220**	150	103	130	120	1.0	2.288
	170	55	1.5	237.0	595.0	990	1,400	**51320**	170	103	142	128	1.5	4.870
	210	85	3.0	370.0	970.0	710	1,000	***51420**	205	103	165	145	2.5	14.66
110	145	25	1.0	87.0	288.0	1,600	2,300	**51122**	145	112	131	124	1.0	1.074
	160	38	1.1	153.0	450.0	1,200	1,800	**51222**	160	113	140	130	1.0	2.458
	190	63	2.0	267.0	750.0	870	1,200	***51322**	187	113	158	142	2.0	7.670
120	155	25	1.0	89.0	310.0	1,500	2,200	**51124**	155	122	141	134	1.0	1.108
	170	39	1.1	154.0	470.0	1,200	1,700	**51224**	170	123	150	140	1.0	2.703
	210	70	2.1	296.0	805.0	780	1,100	***51324**	205	123	173	157	2.0	10.80
130	170	30	1.0	104.0	350.0	1,300	1,900	**51126**	170	132	154	146	1.0	1.733
	190	45	1.5	191.0	565.0	1,000	1,500	***51226**	187	133	166	154	1.5	4.200
	225	75	2.1	330.0	960.0	720	1,000	***51326**	220	134	186	169	2.0	12.70
140	180	31	1.0	107.0	375.0	1,300	1,800	***51128**	178	142	164	156	1.0	1.910
	200	46	1.5	193.0	595.0	980	1,400	***51228**	197	143	176	164	1.5	4.765
	240	80	2.1	350.0	1050.0	670	960	***51328**	235	144	199	181	2.0	15.30
150	190	31	1.0	109.0	400.0	1,200	1,800	***51130**	188	152	174	166	1.0	2.011
	215	50	1.5	220.0	685.0	900	1,300	***51230**	212	153	189	176	1.5	5.800
	250	80	2.1	360.0	1130.0	660	940	***51330**	245	154	209	191	2.0	16.10
160	200	31	1.0	112.0	425.0	1,200	1,700	***51132**	198	162	184	176	1.0	2.100
	225	51	1.5	223.0	720.0	870	1,200	***51232**	222	163	199	186	1.5	6.320
	270	87	3.0	450.0	1470.0	600	860	***51332**	265	164	225	205	2.5	20.71
170	215	34	1.1	134.0	510.0	1,100	1,600	***51134**	213	172	197	188	1.0	2.770
	240	55	1.5	261.0	835.0	810	1,200	***51234**	237	173	212	198	1.5	7.802
	280	87	3.0	465.0	1570.0	590	840	***51334**	275	174	235	215	2.5	21.59

Note: 1) is the minimal permitted dimension of chamfer "r".
2) is the maximal permitted dimension of shaft washer outer diameter "d_1".
3) is the minimal permitted dimension of housing washer internal bore dimension "D_1".

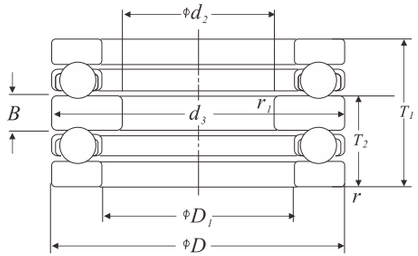


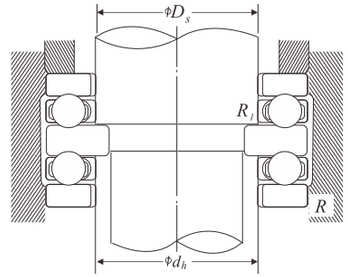


d 180~200 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Dimensions (mm)		Mounting dimensions(mm)			Reference mass (kg)
d	D	T	r[1] (Min)	C_a	C_{0a}	Grease	Oil		$d_{1s\,max}$[2]	$D_{1s\,min}$[3]	D_s Max	d_h Max	R Max	
180	225	34	1.1	135.0	525.0	1,100	1,500	***51136**	222	183	207	198	1.0	2.920
	250	56	1.5	266.0	875.0	780	1,100	***51236**	247	183	222	208	1.5	8.338
	300	95	3.0	490.0	1700.0	540	780	***51336**	295	184	251	229	2.5	27.46
190	240	37	1.1	170.0	655.0	980	1,400	***51138**	237	193	220	210	1.0	3.750
	270	62	2.0	310.0	1060.0	710	1,000	***51238**	267	194	238	222	2.0	11.31
	320	105	4.0	545.0	1950.0	500	710	***51338**	315	195	266	244	3.0	34.89
200	250	37	1.1	172.0	675.0	960	1,400	***51140**	247	203	230	220	1.0	3.922
	280	62	2.0	315.0	1110.0	700	990	***51240**	277	204	248	232	2.0	11.78
	340	110	4.0	595.0	2220.0	470	670	***51340**	335	205	282	258	3.0	41.79

Remarks: Part number starting with the sign * represents its shaft washer outside diameter is smaller than housing washer outside diameter. Therefore, when using this type of bearings, the shape of the housing bore does not need to be the same as that shown in the Fig. If there is a withdrawal groove at the outer diameter of the inner ring, the housing can be made into cylindrical shape directly.



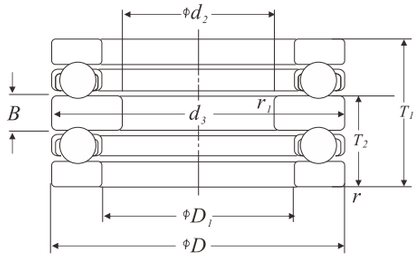


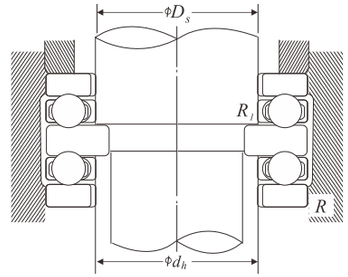
d 10~50 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal type	Dimensions (mm)				Mounting dimensions (mm)				Reference mass (kg)
d_2	D	T_1	r_{smin} 1)	r_{1smin} 1)	C_a	C_{0a}	Grease	Oil		$d_{3s\,max}$ 2)	$D_{1s\,min}$ 3)	B	T_2	D_s Max	d_h Max	R Max	R_1 Max	
10	32	22	0.6	0.3	16.6	24.8	5,000	7,100	**52202**	32	17	5	13.5	15	22	0.6	0.3	0.085
15	40	26	0.6	0.3	22.3	37.5	4,100	5,900	**52204**	40	22	6	16.0	20	28	0.6	0.3	0.149
	60	45	1	0.6	55.5	89.5	2,600	3,700	**52405**	60	27	11	28.0	25	39	1	0.6	0.630
20	47	28	0.6	0.3	27.8	50.5	3,700	5,300	**52205**	47	27	7	17.5	25	34	0.6	0.3	0.212
	52	34	1	0.3	35.5	61.5	3,200	4,600	**52305**	52	27	8	21.0	25	36	1	0.3	0.327
	70	52	1	0.6	72.5	126.0	2,200	3,200	**52406**	70	32	12	32.0	30	46	1	0.6	1.01
25	52	29	0.6	0.3	29.3	58.0	3,400	4,900	**52206**	52	32	7	18.0	30	39	0.6	0.3	0.252
	60	38	1	0.3	43	78.5	2,800	3,900	**52306**	60	32	9	23.5	30	42	1	0.3	0.488
	80	59	1.1	0.6	87	155.0	1,900	2,800	**52407**	80	37	14	36.5	35	53	1	0.6	1.44
30	62	34	1	0.3	39	78.0	2,900	4,200	**52207**	62	37	8	21.0	35	46	1	0.3	0.418
	68	36	1	0.6	47	98.5	2,700	3,900	**52208**	68	42	9	22.5	40	51	1	0.6	0.559
	68	44	1	0.3	55.5	105	2,400	3,500	**52307**	68	37	10	27.0	35	48	1	0.3	0.678
	78	49	1	0.6	69.0	135	2,200	3,100	**52308**	78	42	12	30.5	40	55	1	0.6	1.06
	90	65	1.1	0.6	112	205	1,700	2,500	**52408**	90	42	15	40.0	40	60	1	0.6	2.03
35	73	37	1	0.6	48	105	2,600	3,700	**52209**	73	47	9	23.0	45	56	1	0.6	0.634
	85	52	1	0.6	80	163	2,000	2,900	**52309**	85	47	12	32.0	45	61	1	0.6	1.34
	100	72	1.1	0.6	130	242	1,600	2,200	**52409**	100	47	17	44.5	45	67	1	0.6	2.71
40	78	39	1	0.6	48.5	111	2,400	3,400	**52210**	78	52	9	24.0	50	61	1	0.6	0.730
	95	58	1.1	0.6	96.5	202	1,800	2,600	**52310**	95	52	14	36.0	50	68	1	0.6	1.80
	110	78	1.5	0.6	158	310	1,400	2,000	**52410**	110	52	18	48.0	50	74	1.5	0.6	3.56
45	90	45	1	0.6	69.5	159	2,100	3,000	**52211**	90	57	10	27.5	55	69	1	0.6	1.14
	105	64	1.1	0.6	119	246	1,600	2,300	**52311**	105	57	15	39.5	55	75	1	0.6	2.41
	120	87	1.5	0.6	178	360	1,300	1,800	**52411**	120	57	20	53.5	55	81	1.5	0.6	4.70
50	95	46	1	0.6	73.5	179	2,000	2,800	**52212**	95	62	10	28.0	60	74	1	0.6	1.25
	110	64	1.1	0.6	123	267	1,600	2,300	**52312**	110	62	15	39.5	60	80	1	0.6	2.56
	130	93	1.5	0.6	214	435	1,200	1,700	**52412**	130	62	21	57.0	60	88	1.5	0.6	6.33
	140	101	2	1	232	495	1,100	1,600	**52413**	140	68	23	62.0	65	95	2	1	8.03

Note: 1) is the minimal permitted dimension of chamfer "r".
2) is the maximal permitted dimension of shaft washer outer diameter "d_1".
3) is the minimal permitted dimension of housing washer internal bore dimension "D_1".

Remarks: Part number starting with the sign * represents its shaft washer outside diameter is smaller than housing washer outside diameter. Therefore, when using this type of bearings, the shape of the housing bore does not need to be the same as that shown in the Fig. If there is a withdrawal groove at the outer diameter of the inner ring, the housing can be made into cylindrical shape directly.





d 55~120 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal type	Dimensions (mm)				Mounting dimensions (mm)				Reference mass (kg)
d_2	D	T_1	r_{smin} 1)	r_{1smin} 1)	C_a	C_{0a}	Grease	Oil		$d_{3s\,max}$ 2)	$D_{1s\,min}$ 3)	B	T_2	D_s Max	d_h Max	R Max	R_1 Max	
55	100	47	1	0.6	75.0	189	1,900	2,700	**52213**	100	67	10	28.5	65	79	1	0.6	1.37
	105	47	1	1	76.0	199	1,800	2,600	**52214**	105	72	10	28.5	70	84	1	1	1.56
	115	65	1.1	0.6	128	287	1,500	2,200	**52313**	115	67	15	40.0	65	85	1	0.6	2.76
	125	72	1.1	1	148	340	1,400	2,000	**52314**	125	72	16	44.0	70	92	1	1	3.75
	150	107	2	1	250	555	1,000	1,500	**52414**	150	73	24	65.5	70	102	2	1	9.72
60	110	47	1	1	77.5	209	1,800	2,600	**52215**	110	77	10	28.5	75	89	1	1	1.67
	135	79	1.5	1	171	395	1,300	1,800	**52315**	135	77	18	48.5	75	99	1.5	1	4.82
	160	115	2	1	269	615	940	1,400	**52415**	160	78	26	70.5	75	110	2	1	11.80
65	115	48	1	1	78.5	218	1,700	2,400	**52216**	115	82	10	29.0	80	94	1	1	1.800
	140	79	1.5	1	176	425	1,200	1,800	**52316**	140	82	18	48.5	80	104	1.5	1	5.070
	170	120	2.1	1	270	620	890	1,300	**52416**	170	83	27	73.5	80	117	2	1	14.80
	180	128	2.1	1.1	288	685	840	1,200	***52417**	179.5	88	29	78.5	85	124	2	1	18.60
70	125	55	1	1	95.5	264	1,600	2,200	**52217**	125	88	12	33.5	85	101	1	1	2.470
	150	87	1.5	1	201	490	1,100	1,600	**52317**	150	88	19	53.0	85	111	1.5	1	6.390
	190	135	2.1	1.1	305	750	790	1,100	***52418**	189.5	93	30	82.5	90	131	2	1	20.80
75	135	62	1.1	1	117	325	1,400	2,000	**52218**	135	93	14	38.0	90	108	1	1	3.260
	155	88	1.5	1	198	490	1,100	1,600	**52318**	155	93	19	53.5	90	116	1.5	1	6.760
80	210	150	3	1.1	370	970	710	1,000	***52420**	209.5	103	33	91.5	100	145	2.5	1	28.20
85	150	67	1.1	1	147	410	1,300	1,800	**52220**	150	103	15	41.0	100	120	1	1	4.270
	170	97	1.5	1	237	595	990	1,400	**52320**	170	103	21	59.0	100	128	1.5	1	8.800
90	230	166	3	1.1	435	1,240	640	920	***52422**	229	113	37	101.5	110	159	2.5	1	37.80
95	160	67	1.1	1	153	450	1,200	1,800	**52222**	160	113	15	41.0	110	130	1	1	4.630
	190	110	2	1	267	705	870	1,200	***52322**	189.5	113	24	67.0	110	142	2	1	13.10
	250	177	4	1.5	455	1340	590	840	***52424**	249	123	40	108.5	120	174	3	1.5	14.80
100	170	68	1.1	1.1	154	470	1,200	1,700	**52224**	170	123	15	41.5	120	140	1	1	5.360
	210	123	2.1	1.1	296	805	780	1,100	***52324**	209.5	123	27	75.0	120	157	2	1	18.40
	270	192	4	2	520	1,590	540	770	***52426**	269	134	42	117.0	130	188	3	2	60.10
110	190	80	1.5	1.1	191	565	1,000	1,500	***52226**	189.5	133	18	49.0	130	154	1.5	1	8.400
120	200	81	1.5	1.1	193	595	980	1,400	***52228**	199.5	143	18	49.5	140	164	1.5	1	9.050

Note: 1) is the minimal permitted dimension of chamfer "r".
2) is the maximal permitted dimension of shaft washer outer diameter "d_1".
3) is the minimal permitted dimension of housing washer internal bore dimension "D_1".

Remarks: Part number starting with the sign * represents its shaft washer outside diameter is smaller than housing washer outside diameter. Therefore, when using this type of bearings, the shape of the housing bore does not need to be the same as that shown in the Fig. If there is a withdrawal groove at the outer diameter of the inner ring, the housing can be made into cylindrical shape directly.

Thrust spherical roller bearing

Thrust spherical roller bearing

Thrust spherical roller bearing

Spherical thrust roller bearings are separable type of bearings. Components with roller cages and housing washers can be mounted respectively. They can be used under extremely heavy load and allow high rotation speed. Its load line and bearing axis form a certain angle. These kind of bearings can also take certain radial load while taking axial load, but the radial load must be less than 55% of the axial load.

These bearings have slantingly arranged spherical rollers in a spherical raceway, and with self-aligning capacity, the bearings can compensate misalignment and shaft deflection.

The contact between roller end face and inner ring rib, cage and guide sleeve is sliding contact, which is difficult for oil lubrication to reach. Therefore, oil lubrication should be used even with low rotation speed conditions.

This kind of bearings is mainly used for hydro generator, vertical type motor, vessel use propeller shaft, whirl crane, machine tool banding wheel, reducer for rolling mill and rolling screw, shaper, etc.

1. Basic type

C&U provides reinforced thrust spherical roller bearings. Bearings with serial numbers 292, 293 and 294 can take large allowable load. According to actual requirements, these cages are generally steel sheet pressed cages and machined solid cages.

2. Allowable misalignment angle

The allowable self-aligning angle of thrust spherical roller bearings is adjustable according to the bearing dimension series. When load P and P_0 do not exceed 0.05 C_0, and shaft washer is rotating, their allowable misalignment angles are shown in the right.

3. Tolerance

The manufacturing tolerance of thrust spherical roller bearings is standard tolerance. Please refer to Section 5 for specific technical explanation.

4. Minimum axial load

For high-speed bearings, if axial load does not reach a specified minimum value, the running of the bearing will be slowed down by the inertial force of the rollers. The minimum axial load F_{amin} is calculated by the following formula:

$$F_{amin} = \frac{C_{0a}}{1400} + A \cdot \left(\frac{D \cdot T \cdot n}{10^6}\right)^2$$

In the equations

C_{0a}: static load rating kN (see bearing specification table)

A: series related coefficient

292 series A=0.0027

293 series A=0.0031

294 series A=0.0021

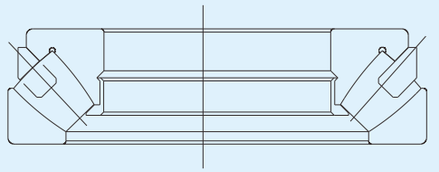
D: housing washer outer diameter (mm)

T: total height (mm)

n: maximum rotation speed (r/min)

If the external force and the weight of the supported machine part are smaller than the minimum load, the additional load must be applied to the bearing, for example by using spring.

Pressed cage



Machined cage

Bearing diameter series	Spherical angle
200 series	1°～1.5°
300 series	1.5°～2°
400 series	2°～3°

5. Dynamic equivalent radial load

When $F_r \leqslant 0.55F_a$, $P=F_a+1.2F_r$, (kN)

6. Static equivalent radial load

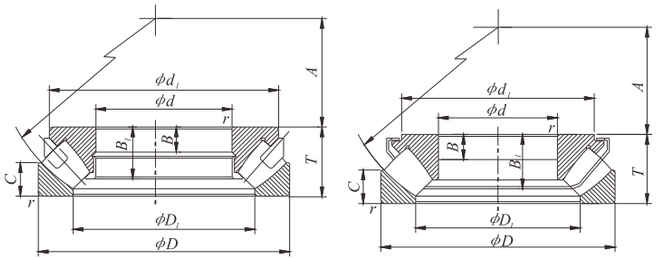
When $F_r \leqslant 0.55F_a$, $P=F_a+2.7F_r$ (kN)

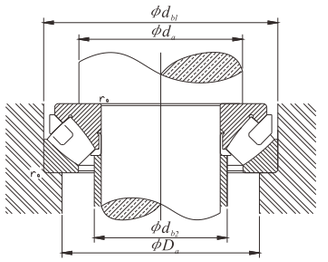
Thrust spherical roller bearing's static load coefficient f_s is selected according to the following conditions:

$f_s \geqslant 8$ The size of the axial support of the adjacent block shoulder conforms to the value in the bearing table (d_a and D_a);

$f_s \geqslant 6$ The axial support of housing washer and shaft washer is supported completely by the entire matching surface. Dimensions D_1 and d_1 are shown in the dimension sheet;

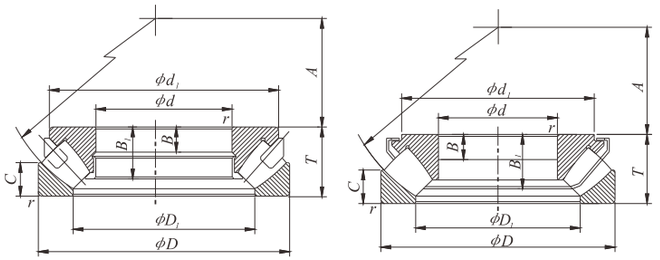
$f_s \geqslant 4$ Complete axial direction support. Dimensions D_1 and d_1 are shown in the dimension sheet, simultaneously with sufficient radial support from housing washer (bearing housing tolerance K7).

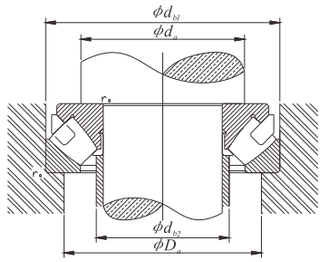




d 60~170 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)	Nominal numbers	Nominal numbers (old)		Reference dimension (mm)						Mounting dimensions (mm)					Reference mass (kg)
d	D	T	r (Min)	C_a	C_{0a}	Oil				d_1	D_1	B	B_1	C	A	d_a Min	D_a Max	d_{b1} Min	d_{b2} Max	r_a Max	
60	130	42	1.5	335	900	2,600	**29412**	**9039412**		115	88	15	36	20	38	90	107	133	70	1.5	2.400
65	140	45	2.0	380	1020	2,400	**29413**	**9039413**		125	94	16	38	21	42	100	115	143	73	2.0	3.030
70	150	48	2.0	430	1200	2,400	**29414**	**9039414**		135	102	17	40	23	44	105	124	153	80	2.0	3.710
75	160	51	2.0	490	1370	2,200	**29415**	**9039415**		140	108	18	43	24	47	115	132	163	86	2.0	4.400
80	170	54	2.1	550	1560	2,000	**29416**	**9039416**		150	116	19	45	26	50	120	141	173	91	2.1	5.280
85	150	39	1.5	345	1060	2,400	**29317**	**9039317**		135	111	14	33	19	50	115	129	153	93	1.5	2.540
	180	58	2.1	600	1730	1,900	**29417**	**9039417**		160	123	21	48	28	54	130	150	183	97	2.1	5.890
90	155	39	1.5	355	1100	2,200	**29318**	**9039318**		140	115	14	33	19	52	118	135	158	99	1.5	2.650
	190	60	2.1	670	1930	1,800	**29418**	**9039418**		170	130	22	50	29	56	135	158	193	103	2.1	7.380
100	170	42	1.5	415	1370	2,000	**29320**	**9039320**		155	129	15	36	20.8	58	132	148	173	109	1.5	3.380
	210	67	3.0	830	2450	1,600	**29420**	**9039420**		185	142	24	55	32	62	150	175	214	112	2.5	10.000
110	190	48	2.0	530	1700	1,800	**29322**	**9039322**		175	142	17	41	23	64	145	165	193	119	2.0	5.040
	230	73	3.0	950	2800	1,500	**29422**	**9039422**		205	158	26	60	35	69	165	192	234	125	2.5	13.100
120	210	54	2.1	640	2080	1,600	**29324**	**9039324**		190	158	19	46	26	70	160	182	213	132	2.1	6.900
	250	78	4.0	1120	3350	1,400	**29424**	**9039424**		220	172	28	64	37	74	180	210	254	135	3.0	16.300
130	225	58	2.1	720	2360	1,500	**29326**	**9039326**		205	169	21	49	28	76	170	195	228	141	2.1	8.490
	270	85	4.0	1250	3900	1,200	**29426**	**9039426**		240	187	31	69	41	81	195	227	275	151	3.0	12.900
140	240	60	2.1	800	2700	1,400	**29328**	**9039328**		220	181	22	51	29	82	185	208	244	152	2.1	9.870
	280	85	4.0	1290	4050	1,200	**29428**	**9039428**		250	194	31	69	41	86	205	237	285	158	3.0	21.900
150	250	60	2.1	815	2850	1,400	**29330**	**9039330**		230	192	22	51	29	87	195	220	254	163	2.1	10.500
	300	90	4.0	1460	4800	1,100	**29430**	**9039430**		270	211	32	74	44	92	220	253	306	171	3.0	26.900
160	270	67	3.0	965	3350	1,300	**29332**	**9039322**		245	206	24	56	32	92	210	236	274	174	2.5	13.600
	320	95	5.0	1660	5300	1,100	**29432**	**9039432**		285	224	34	78	45	99	230	271	326	181	4.0	31.600
170	280	67	3.0	1000	3450	1,200	**29334**	**9039334**		255	215	24	57	32	96	220	247	284	184	2.5	14.200
	340	103	5.0	1860	6000	1,000	**29434**	**9039434**		305	239	37	84	50	104	245	288	346	191	4.0	39.200

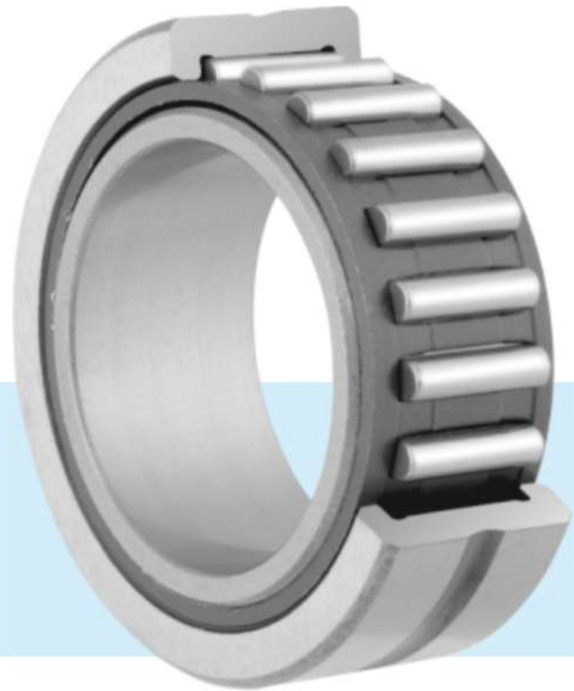




d 180~240 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)	Nominal numbers	Nominal numbers (old)		Reference dimension (mm)						Mounting dimensions (mm)					Reference mass (kg)
d	D	T	r (Min)	C_a	C_{0a}	Oil				d_1	D_1	B	B_1	C	A	d_a Min	D_a Max	d_{b1} Min	d_{b2} Max	r_a Max	
180	300	73	3.0	1180	4150	1,100	29336	9039366		275	230	26	61	35	103	235	263	304	193	2.5	18.10
	360	109	5.0	2080	6800	900	29436	9039436		320	253	39	89	52	110	260	305	366	202	4.0	46.20
190	320	78	4.0	1320	4650	1,100	29338	9039338		295	243	28	66	38	110	250	281	325	206	3.0	22.80
	380	115	5.0	2320	7500	850	29438	9039438		340	268	41	94	55	117	275	322	386	214	4.0	54.90
200	280	48	2.0	655	2650	1,500	29240	9039240		265	236	17	—	24	108	235	258	284	211	2.0	8.150
	340	85	4.0	1530	5300	1,000	29340	9039340		310	258	31	71	41	116	265	298	348	215	3.0	28.00
	400	122	5.0	2550	8500	800	29440	9039440		360	282	44	99	59	122	290	338	406	225	4.0	64.70
220	300	48	2.0	720	3150	1,400	29244	9039244		285	254	17	—	24	117	260	277	304	229	2.0	9.180
	360	85	4.0	1560	5600	950	29344	9039344		330	279	—	71	41	125	285	316	368	235	3.0	29.90
	420	122	6.0	2600	8500	800	29444	9039344		375	303	—	99	58	132	310	360	428	243	5.0	67.40
240	340	60	2.1	1040	4500	1,200	29248	9039248		320	282	22	—	30	130	285	311	344	251	2.1	16.10
	380	85	4.0	1700	6400	950	29348	9039348		350	299	—	71	41	135	300	337	390	256	3.0	32.50
	440	122	6.0	2700	9500	750	29448	9039448		400	321	—	99	59	142	330	381	448	265	5.0	73.50

Needle roller bearing



Needle roller bearing

Needle roller bearing

Needle roller bearings contain multiple long and thin needle rollers whose length is 3~10 times longer than their diameter. The structure is compact, and the inscribed circle diameter of the needle roller is close to the outer diameter of the bearing, so the radial load capacity is high.

1. Main structure

(1) Solid outer ring needle roller bearing NA 0000 type, NKI type

This type of bearing has an inner ring and an outer ring (with locking ring, needle rollers and cage). It has a high limit speed and falls into two types: single row and double row.

Single row:NA48, NA49, NA69 series (d <32mm) and NKI type.

When d ⩽7mm, the bearing outer ring has ring locking collars; when d>7mm, bearing outer ring has double ribs.

Double row: NA69 series (d⩾32mm)

RNA type solid outer ring needle roller bearings have no inner ring. Either with or without a cage is acceptable and there may be one or two rows of needle rollers.

(2) Needle roller and cage assembly K0000

The needle roller and cage assembly are independent bearing units, and the needle roller is precisely guided by the cage. This kind of bearing has no ring, and are featured by small radial surface and large bearing capacity. It is suitable for supporting structure with limited radial installation size. The bearing diameter surface and housing hole surface matched with the bearing are directly used as the inner and outer rolling surface of the bearing. The surface hardness is generally 58~64HRC, the surface hardened layer depth is 0.6~1mm, and the raceway surface roughness Ra value is usually 0.32μm. When shaft rotation accuracy is required, Ra value is 0.20μm. When the dimensional tolerance of housing hole is G6, the dimensional tolerance of shaft is recommended as shown in Table 1. The shaft and housing hole raceway form tolerances are recommended in Table 2.

(3) HK and BK type drawn cup needle roller bearings without inner ring and with cage

HK type, bearing with open ends

BK type, one end of bearing is sealed type; it is used for the supporters without protruding end on the journal, and can bear small axial movement force, and the sealed end is used for sealing.

This kind of bearing is composed of a thin-wall stamped outer ring, cage and needle rollers. The cost is low, the load capacity is high, and it is suitable for supporting structures with limited radial installation dimension. The surface of the shaft journal surface is directly used as the raceway after hardening. The bearing is fed into the housing bore with interference fit, and there is no need to provide axial location. The bearing shall be filled with sufficient lubricating grease before mounted. Generally, no further lubrication is needed after assembly.

2. Cage material

The needle roller bearing cage is generally made of low carbon high quality steel, but other materials such as nylon can also be used.

3. Allowable misalignment angle

Needle roller bearings are generally not allowed to have an angular misalignment. During operation, the maximum bending angle on the span of the needle roller shall not be greater than 0.25%.

4. Tolerance and clearance

The radial clearance value of cylindrical roller bearings is used for needle roller bearings with inner ring, outer rings and cage (except stamped outer rings and heavy series bearings).

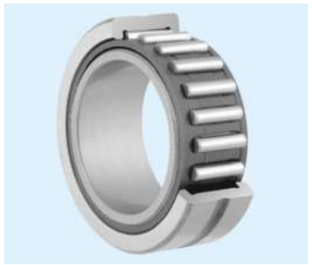
For heavy series bearings with inner and outer rings and needle roller bearings with cage whose inner ring is delivered as a separate part, their radial clearance adopts the radial clearance value of cylindrical roller bearing according to inner ring raceway diameter or needle roller assembly inscribed circle diameter.

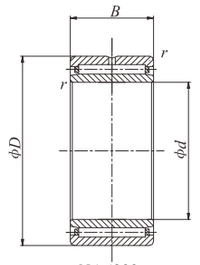
Table 1 Dimension tolerance of the shaft

Radial clearance group	Dimensional tolerance of shaft	
	Shaft diameter's nominal dimension ⩽80mm	Shaft diameter's nominal dimension >80mm
< 0 group	j5	h5
= 0 group	h5	g5
> 0 group	g6	f6

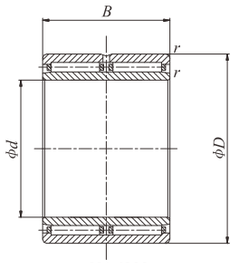
Table 2 Raceway form tolerance

Shaft diameter's nominal dimension (mm)	Over	3	10	18	30	50	80
	To	10	18	30	50	80	-
Cylindricity (μm)	Shaft	2.5	3	4	4	5	6
	Housing hole	4	5	6	7	8	10





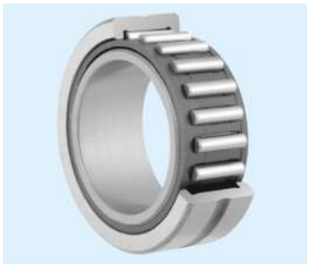
NA 4900
NKI d/B

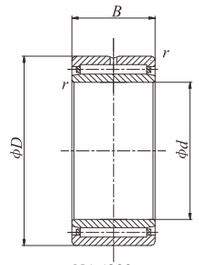


NA 6900

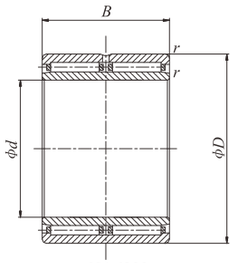
d 10~25 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Bearing Numbers	Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil		
10	22	13	0.3	8.8	10.4	17000	26000	**NA4900**	0.023
	22	16	0.3	10.2	12.5	17000	26000	**NKI10/16**	0.029
	22	20	0.3	12.8	16.6	17000	26000	**NKI10/20**	0.037
12	24	13	0.3	9.9	12.2	16000	24000	**NA4901**	0.026
	24	16	0.3	11.7	15.3	16000	24000	**NKI12/16**	0.033
	24	20	0.3	14.5	20.0	16000	24000	**NKI12/20**	0.042
	24	22	0.3	16.1	23.2	16000	24000	**NA6901**	0.046
15	27	16	0.3	13.4	19.0	14000	20000	**NKI15/16**	0.039
	27	20	0.3	16.5	25.5	14000	20000	**NKI15/20**	0.049
	28	13	0.3	11.2	15.3	13000	19000	**NA4902**	0.034
	28	23	0.3	17.2	27.0	13000	19000	**NA6902**	0.064
17	29	16	0.3	13.8	20.4	13000	19000	**NKI17/16**	0.043
	29	20	0.3	17.2	27.0	13000	19000	**NKI17/20**	0.054
	30	13	0.3	11.4	16.3	12000	18000	**NA4903**	0.037
	30	23	0.3	18.7	30.5	12000	18000	**NA6903**	0.072
20	32	16	0.3	15.4	24.5	10000	16000	**NKI20/16**	0.049
	32	20	0.3	19.0	32.5	10000	16000	**NKI20/20**	0.061
	37	17	0.3	21.6	28.0	9500	15000	**NA4904**	0.075
	37	30	0.3	35.2	53.0	9500	15000	**NA6904**	0.140
22	34	16	0.3	15.7	26.0	9500	15000	**NKI22/16**	0.052
	34	20	0.3	19.4	34.5	9500	15000	**NKI22/20**	0.065
	39	17	0.3	23.3	32.0	9000	14000	**NA49/22**	0.080
	39	30	0.3	36.9	57.0	9000	14000	**NA69/22**	0.150
25	38	20	0.3	22.0	36.5	9000	14000	**NKI25/20**	0.080
	38	30	0.3	31.9	60.0	9000	14000	**NKI25/30**	0.120





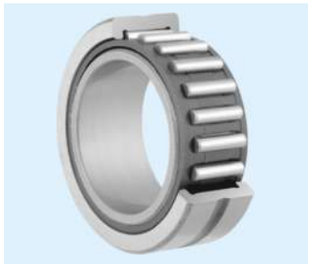
NA 4900
NKI d/B

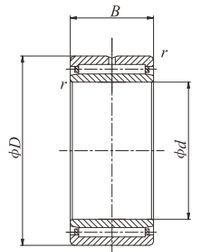


NA 6900

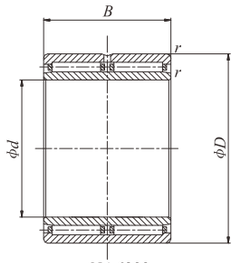
d 25~42 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Bearing Numbers	Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil		
25	42	17	0.3	24.2	34.5	8500	13000	**NA4905**	0.088
	42	30	0.3	38.0	62.0	8500	13000	**NA6905**	0.160
28	42	20	0.3	23.3	40.5	8000	12000	**NKI28/20**	0.097
	42	30	0.3	34.1	65.5	8000	12000	**NKI28/30**	0.150
	45	17	0.3	25.1	36.5	8000	12000	**NA49/28**	0.098
	45	30	0.3	39.6	65.5	8000	12000	**NA69/28**	0.180
30	45	20	0.3	24.6	45.0	7500	11000	**NKI30/20**	0.110
	45	30	0.3	35.8	72.0	7500	11000	**NKI30/30**	0.170
	47	17	0.3	25.5	39.0	7500	11000	**NA4906**	0.100
	47	30	0.3	42.9	75.0	7500	11000	**NA6906**	0.190
32	47	20	0.3	25.1	46.5	7500	11000	**NKI32/20**	0.120
	47	30	0.3	36.9	76.5	7500	11000	**NKI32/30**	0.180
	52	20	0.6	30.8	51.0	7000	10000	**NA49/32**	0.160
	52	36	0.6	47.3	90.0	7000	10000	**NA69/32**	0.290
35	50	20	0.3	26.4	51.0	7000	10000	**NKI35/20**	0.13
	50	30	0.3	38.0	83.0	7000	10000	**NKI35/30**	0.19
	55	20	0.6	31.9	54.0	6700	9500	**NA4907**	0.17
	55	36	0.6	48.4	93.0	6700	9500	**NA6907**	0.31
38	53	20	0.3	27.5	55.0	6700	9500	**NKI38/20**	0.14
	53	30	0.3	40.2	90.0	6700	9500	**NKI38/30**	0.21
40	55	20	0.3	27.5	57.0	6300	9000	**NKI40/20**	0.14
	55	30	0.3	40.2	93.0	6300	9000	**NKI40/30**	0.22
	62	22	0.6	42.9	71.0	5600	8000	**NA4908**	0.23
	62	40	0.6	67.1	125	5600	8000	**NA6908**	0.43
42	57	20	0.3	29.2	61.0	6000	8500	**NKI42/20**	0.15
	57	30	0.3	41.8	98.0	6000	8500	**NKI42/30**	0.22





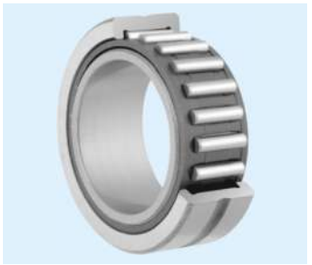
NA 4900
NKI d/B

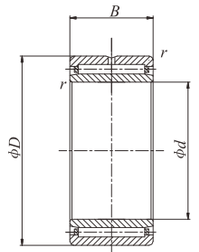


NA 6900

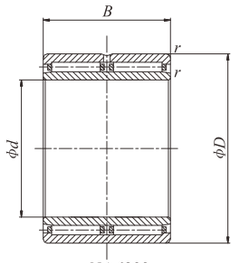
d 45~75 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Bearing Numbers	Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil		
45	62	62	0.6	38.0	78.0	5600	8000	**NKI45/25**	0.23
	62	62	0.6	49.5	110	5600	8000	**NKI45/35**	0.32
	68	68	0.6	45.7	78.0	5300	7500	**NA4909**	0.27
	68	68	0.6	70.4	137	5300	7500	**NA6909**	0.50
50	68	68	0.6	40.2	88.0	5300	7500	**NKI50/25**	0.27
	68	68	0.6	52.3	122	5300	7500	**NKI50/35**	0.38
	72	72	0.6	47.3	85.0	5000	7000	**NA4910**	0.27
	72	72	0.6	73.7	150	5000	7000	**NA6910**	0.52
55	72	25	0.6	41.8	96.5	4800	6700	**NKI55/25**	0.27
	72	35	0.6	55.0	134	4800	6700	**NKI55/35**	0.38
	80	25	1.0	57.2	106	4500	6300	**NA4911**	0.40
	80	45	1.0	89.7	190	4500	6300	**NA6911**	0.78
60	82	25	0.6	44.0	95.0	4300	6000	**NKI60/25**	0.40
	82	35	0.6	60.5	146	4300	6000	**NKI60/35**	0.55
	85	25	1.0	60.5	114	4300	6000	**NA4912**	0.43
	85	45	1.0	93.5	204	4300	6000	**NA6912**	0.81
65	90	25	1.0	52.8	106	4000	5600	**NKI65/25**	0.47
	90	35	1.0	73.7	163	4000	5600	**NKI65/35**	0.66
	90	25	1.0	61.6	120	4000	5600	**NA4913**	0.46
	90	45	1.0	95.2	212	4000	5600	**NA6913**	0.83
70	95	25	1.0	56.1	127	3600	5000	**NKI70/25**	0.52
	95	35	1.0	76.5	190	3600	5000	**NKI70/35**	0.74
	100	30	1.0	84.2	163	3600	5000	**NA4914**	0.73
	100	54	1.0	128	285	3600	5000	**NA6914**	1.35
75	105	25	1.0	69.3	132	3400	4800	**NKI75/25**	0.64
	105	35	1.0	96.8	200	3400	4800	**NKI75/35**	0.91





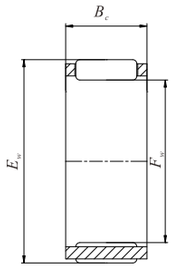
NA 4900
NKI d/B



NA 6900

d 75~100 mm

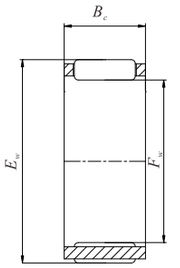
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Bearing Numbers	Reference mass (kg)
d	D	B	r (Min)	C_r	C_{0r}	Grease	Oil		
75	105	25	1.0	84.2	140	3200	4800	**NA4915**	0.68
	105	35	1.0	130	216	3200	4800	**NA6915**	0.96
80	110	30	1.0	72.1	183	3200	4500	**NKI80/25**	0.88
	110	54	1.0	101	315	3200	4500	**NKI80/35**	1.50
	110	26	1.0	88.0	146	3000	4500	**NA4916**	0.75
	110	36	1.0	134	232	3000	4500	**NA6916**	1.05
85	115	35	1.0	73.7	250	2800	4300	**NKI85/26**	1.25
	115	63	1.0	105	425	2800	4300	**NKI85/36**	2.20
	120	26	1.0	108	156	2800	4000	**NA4917**	0.78
	120	36	1.0	165	250	2800	4000	**NA6917**	1.10
90	120	35	1.1	76.5	265	2600	4000	**NKI90/26**	1.30
	120	63	1.1	108	450	2600	4000	**NKI90/36**	2.30
	125	26	1.0	112	166	2600	3800	**NA4918**	0.82
	125	63	1.0	172	265	2600	3800	**NA6918**	1.15
95	125	35	1.1	78.1	270	2400	3800	**NKI95/26**	1.40
	125	63	1.1	112	465	2400	3800	**NKI95/36**	2.50
	130	30	1.1	114	220	2400	3600	**NA4919**	1.00
	130	40	1.1	172	305	2400	3600	**NA6919**	1.35
100	130	30	1.1	96.8	280	2200	3600	**NKI100/30**	1.90
	130	40	1.1	123	320	2200	3600	**NKI100/40**	3.00
	140	40	1.0	125	170	3400	3400	**NA4920**	0.78



Single row K type

F_w 10~16 mm

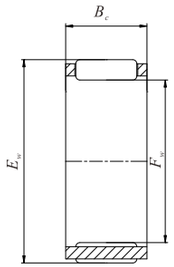
Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers	Reference mass (g)
F_w	E_w	B_c	C_r	C_{0r}	Oil		
10	13	10	4500	5250	27000	**K101310**	1.6
	13	13	6000	7600	27000	**K101313**	2.1
	13	16	6300	7800	27000	**K101316**	2.2
	14	10	7000	7900	27000	**K101410**	2.9
	14	13	8000	9100	26000	**K101413**	4.3
	16	12	7000	9300	27000	**K101612**	3.7
12	15	9	4120	5210	25000	**K121509**	2.7
	15	10	4320	5730	25000	**K121510**	1.9
	15	13	6000	8100	25000	**K121513**	2.4
	16	8	4200	4700	25000	**K121608**	2.9
	16	10	6000	6900	25000	**K121610**	3.8
	16	13	7900	9200	25000	**K121613**	3.4
14	17	10	5100	6800	23000	**K141710**	4.0
	17	17	9300	14000	23000	**K141717**	6.8
	18	10	6800	8300	23000	**K141810**	4.8
	18	13	8100	9800	23000	**K141813**	6.3
	18	14	9200	12000	23000	**K141814**	6.8
	18	15	10000	13000	23000	**K141815**	7.3
15	14	14	7500	11000	23000	**K151814**	5.3
	18	17	9600	15900	23000	**K151817**	6.4
	19	10	7200	9000	22000	**K151910**	5.1
	19	13	8300	9800	22000	**K151913**	7.0
	19	17	10300	15000	22000	**K151917**	8.8
	19	24	12800	20100	22000	**K151924**	10.5
16	20	10	7600	9700	22000	**K162010**	5.7
	20	13	8700	11300	22000	**K162013**	7.1
	20	17	11200	16300	22000	**K162017**	9.2
	21	10	9000	12000	22000	**K162110**	6.7
	22	12	11000	12000	21000	**K162212**	10.4
	22	13	12000	13400	21000	**K162213**	11.9



Single row K type

F_w 18~25 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers	Reference mass (g)
F_w	E_w	B_c	C_r	C_{0r}	Oil		
18	22	10	8200	9900	20000	**K182210**	6.1
	22	13	9000	12100	20000	**K182213**	7.7
	22	17	11900	17600	20000	**K182217**	10.8
	24	12	11200	12900	20000	**K182412**	11.6
	24	13	12900	14900	20000	**K182413**	12.6
	24	20	20000	26500	20000	**K182420**	19.0
20	24	10	8700	12100	19000	**K202410**	6.5
	24	12	9600	13800	19000	**K202412**	8.0
	24	13	9600	13800	19000	**K202413**	8.9
	24	17	12400	20000	19000	**K202417**	11.2
	26	12	13100	15700	19000	**K202612**	13.2
	26	13	14100	17400	19000	**K202613**	14.3
22	26	10	8700	12900	18000	**K222610**	7.1
	26	13	10000	15400	18000	**K222613**	9.4
	26	17	13100	22100	18000	**K222617**	12.1
	27	13	14000	23000	18000	**K222713**	10.8
	28	17	19000	26500	18000	**K222817**	19.7
	28	23	20000	27000	19000	**K222823**	26.0
24	28	10	9400	14300	17000	**K242810**	8.1
	28	13	10500	17000	17000	**K242813**	10.1
	28	17	14000	24500	17000	**K242817**	13.2
	29	13	13100	19100	16000	**K242913**	13.5
	30	17	19000	27000	16000	**K243017**	21.5
	30	31	27000	43000	16000	**K243031**	39.1
25	29	10	9700	14900	16000	**K252910**	8.3
	29	13	10800	17900	16000	**K252913**	10.4
	29	17	14500	25500	16000	**K252917**	13.7
	30	25	21700	40400	15000	**K253025**	21.0
	30	26	20100	26500	15000	**K253026**	21.6
	31	17	19000	28000	16000	**K253117**	21.8

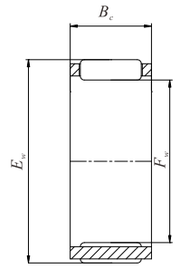


Single row K type

F_w 26~35 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers	Reference mass (g)
F_w	E_w	B_c	C_r	C_{0r}	Oil		
26	30	10	9500	15500	16000	**K263010**	9.0
	30	13	11100	18700	16000	**K263013**	11.4
	30	17	14700	27000	16000	**K263017**	15.0
	31	13	12400	18400	15000	**K263113**	9.9
	31	15	12500	19000	16000	**K263115**	10.3
	30	22	15200	28000	15000	**KK263022**	12.3
28	32	17	15000	32400	14000	**K283217**	18.2
	33	13	14800	23600	14000	**K283313**	15.2
	33	17	19100	33000	14000	**K283317**	19.5
	33	27	22800	40500	14000	**K283327**	19.0
	34	17	21300	35000	14000	**K283417**	24.2
	35	16	21000	29000	14000	**K283516**	29.0
30	34	13	11800	21200	13000	**K303413**	14.6
	35	13	15100	25000	13000	**K303513**	16.3
	35	17	19100	33500	13000	**K303517**	21.3
	35	27	30000	58500	13000	**K303527**	33.3
	37	16	22500	33000	13000	**K303716**	26.4
	37	18	25500	38000	13000	**K303718**	34.0
32	37	13	15000	25000	12000	**K323713**	18.3
	37	17	19400	35000	12000	**K323717**	22.4
	37	27	29500	59500	12000	**K323727**	36.7
	37	28	23100	43000	12000	**K323728TN**	22.3
	38	16	21000	34000	12000	**K323816**	25.0
	38	20	26000	44500	12000	**K323820**	31.0
35	40	13	15800	27500	11000	**K354013**	18.8
	40	17	20300	38000	11000	**K354017**	25.3
	40	25	29000	59500	11000	**K354025**	31.0
	40	27	24500	48000	11000	**K235427TN**	23.4
	40	27	27800	62100	11000	**K354027**	28.0
	40	30	25000	49500	11000	**K354030**	43.0

Remarks: The suffix TN represents nylon cage.

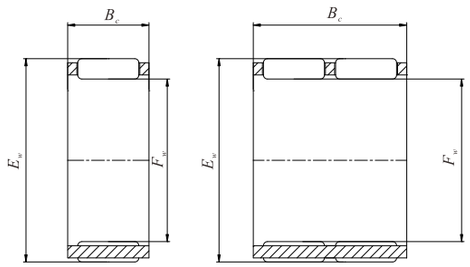


Single row K type

F_w 37~50 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers	Reference mass (g)
F_w	E_w	B_c	C_r	C_{0r}	Oil		
37	42	17	21900	42500	10000	**K374217**	25.8
	42	27	31500	67500	10000	**K374227**	40.7
	45	26	43500	73500	10000	**K374526**	60.5
38	43	17	20000	38000	10000	**K384317**	26.1
	43	27	31000	67500	10000	**K384327**	43.2
	46	20	35000	56500	10000	**K384620**	46.0
40	44	13	13500	28000	10000	**K404413**	20.0
	45	13	17100	32000	10000	**K404513**	21.5
	45	17	20900	41000	10000	**K404517**	27.4
	45	21	24400	49500	10000	**K404521**	36.5
	45	27	32500	72500	10000	**K404527**	46.0
	46	17	24500	44500	9000	**K404617**	30.0
42	47	13	17300	33000	9000	**K424713**	22.5
	47	17	21100	42500	9000	**K424717**	31.1
	47	25	27000	57500	9000	**K424725TN**	25.7
	47	27	33000	74500	9000	**K424727**	46.6
	48	35	35000	76000	9000	**K424835**	60.0
	50	18	31000	49500	12000	**K425018**	53.0
45	49	19	17500	40000	8000	**K454919**	27.0
	50	17	22000	45500	8000	**K455017**	25.5
	50	27	34000	79500	8000	**K455027**	50.0
	50	32	38000	90500	8000	**K455032TN**	45.0
	52	18	31000	56500	8000	**K455218**	51.0
	52	21	39500	57500	8000	**K455221TN**	32.9
50	55	14	17500	36000	7500	**K505514**	31.0
	55	17	21400	46500	7500	**K505517**	35.0
	55	20	26000	59500	7500	**K505520**	39.4
	55	30	38500	96500	7500	**K505530**	59.4
	57	18	33000	62500	7000	**K505718**	53.4
	58	20	35000	61500	7000	**K505820**	64.9

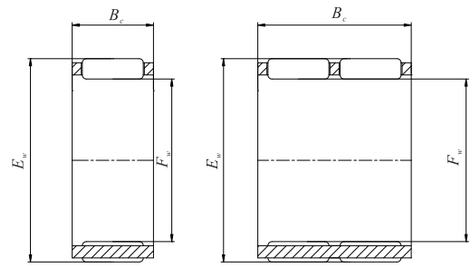
Remarks: The suffix TN represents nylon cage.



Single row K type *Double row KK type*

F_w 55~80 mm

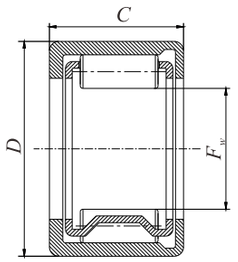
Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers	Reference mass (g)
F_w	E_w	B_c	C_r	C_{0r}	Oil		
55	60	20	28000	65500	**6500**	**K556020**	43.4
	60	27	37500	96500	**6500**	**K556027**	60.5
	60	30	40500	100300	**6500**	**K556030**	68.6
	61	20	41000	110000	**6500**	**K556120**	56.0
	62	18	35000	69500	**6500**	**K556218**	58.4
	63	15	24500	40500	**6500**	**K556315**	53.0
60	65	20	29000	71500	**6000**	**K606520**	50.5
	65	30	42000	115500	**6000**	**K606530**	71.2
	65	20	43000	84500	**5500**	**K606820**	79.0
	68	23	49000	110500	**5500**	**K606823**	94.0
	68	25	52500	84500	**5500**	**K606825**	97.0
	68	27	59000	100500	**6000**	**K606827**	98.0
70	76	20	35500	85500	**4500**	**K707620**	70.0
	76	30	51500	138500	**4500**	**K707630**	100
	78	25	51500	111500	**4500**	**K707825**	115
	78	30	59500	134500	**4500**	**K707830**	136
	80	30	72500	147500	**4500**	**K708030**	150
	78	46	77500	188000	**4500**	**KK707846**	230
75	81	20	37000	93500	**4500**	**K758120**	72.0
	81	30	51500	142000	**4500**	**K758130**	106
	83	23	49500	108000	**4500**	**K758323**	113
	83	30	61500	142000	**4000**	**K758330**	147
	83	35	62500	146000	**4000**	**KK758335**	165
	83	40	72500	176500	**4000**	**KK758340**	190
80	86	20	38000	97500	**4000**	**K808620**	76.0
	86	30	55500	158500	**4000**	**K808630**	114
	88	30	71500	178500	**4000**	**K808830**	141
	88	40	75500	191500	**4000**	**KK808840**	204
	88	46	87500	230000	**4000**	**KK808846**	235



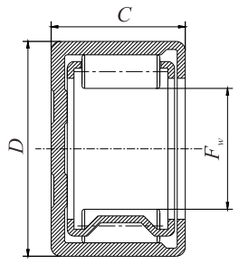
Single row K type *Double row KK type*

F_w 85~110 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers	Reference mass (g)
F_w	E_w	B_c	C_r	C_{0r}	Oil		
85	92	20	44000	107500	3500	**K859220**	96.0
90	97	20	44500	122500	3000	**K909720**	103
	98	27	60500	149500	3000	**K909827**	150
	98	30	67500	171500	3000	**K909830**	172
95	102	20	45500	122500	2900	**K9510220**	110
	103	30	68500	179500	2900	**K9510330**	177
	103	40	82500	227500	2900	**KK9510340**	250
100	107	21	47500	126500	2700	**K100×107×21**	120
	108	27	56500	142500	2700	**K100×108×27**	176
	108	30	70500	187500	2700	**K100×108×30**	190
105	112	21	47000	126500	2500	**K105×112×21**	123
	113	30	71500	196500	2500	**K105×113×30**	198
110	118	30	77500	218500	2300	**K110×118×30**	217



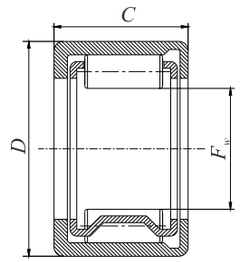
HK type with open ends



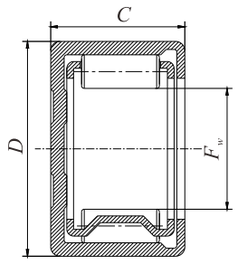
BK type with closed ends

F_w 5~10 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers and reference mass			
F_w	D	C	C_r	C_{0r}	Oil	With open ends	Weight (g)	With closed ends	Weight (g)
5	9	9	2200	1790	36000	HK050909	1.6	BK050909	2.1
6	10	7	1600	1400	30000	HK061007	1.8	—	—
	10	8	1830	1550	32000	HK061008	2.1	BK061008	2.2
	10	9	2650	2400	30000	HK061009	2.2	BK061009	2.6
	10	11	1700	1500	29000	HK061011	2.3	—	—
	12	8	2230	2010	33000	HK061208	2.5	—	—
7	11	9	2800	2150	27000	HK071109	2.3	BK071109	2.9
	12	8	3300	3220	37000	HK071208	2.2	—	—
	12	9	3400	3150	37000	HK071209	2.4	—	—
8	12	8	2550	2400	21000	HK081208	2.7	BK081208	3.0
	12	10	3700	3450	21000	HK081210	3.0	BK081210	3.4
	14	10	3800	3950	25000	HK081410	5.4	BK081410	5.8
	14	12	4100	4320	25000	HK081412	6.6	—	—
9	13	8	3650	4050	25000	HK091308	3.0	BK091308	3.4
	13	10	4050	4250	25000	HK091310	4.0	BK091310	4.0
	13	11	4300	4700	25000	HK091311	4.1	—	—
	13	12	5000	6300	25000	HK091312	4.6	BK091312	4.9
	15	10	5300	6300	25000	HK091510	5.6	BK091510	5.6
10	13	8	4100	4800	20000	HK101308	3.5	—	—
	14	10	3900	4800	19000	HK101410	4.1	BK101410	4.3
	14	12	5000	6300	19000	HK101412	4.8	BK101412	5.0
	14	15	6700	7800	19000	HK101415	6.0	BK101415	6.2
	15	15	6800	8800	19000	HK101515	6.5	—	—
	16	10	6800	8800	18000	HK101610	6.5	BK101610	6.8
	16	12	6800	8800	18000	HK101612	7.5	—	—
	16	15	6800	8800	18000	HK101615	11.0	—	—
	17	15	7200	8000	19000	HK101715	11.5	—	—
	18	12	5500	4900	19000	HK101812	8.5	—	—



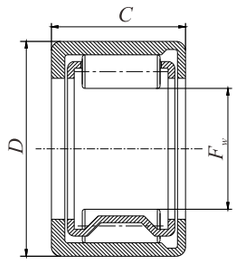
HK type with open ends



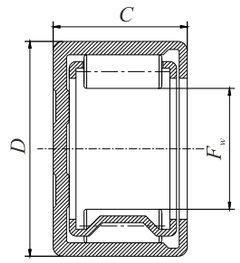
BK type with closed ends

F_w 12~16 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers and reference mass			
F_w	D	C	C_r	C_{0r}	Oil	With open ends	Weight (g)	With closed ends	Weight (g)
12	16	8	4150	5800	19000	HK121608	3.3	—	—
	16	10	4150	5800	19000	HK121610	4.6	BK121610	5.2
	16	12	3800	5100	15000	HK121612	5.6	BK121612	6.2
	17	12	5100	7000	15000	HK121712	7.5	—	—
	17	15	5100	7000	15000	HK121715	1.6	BK121715	2.1
	17	18	5100	7000	15000	HK121718	11.0	—	—
	18	12	5500	7000	17000	HK121812	9.1	BK121812	10.3
	18	14	6500	6300	15000	HK121814	10.6	—	—
	19	12	6800	7400	15000	HK121912	10	—	—
13	19	11	6300	6300	14000	HK131911	8.5	—	—
	19	12	6200	7100	17000	HK131912	8.9	BK131912	11.2
14	20	10	6700	7000	16000	HK142010	8.3	BK142010	12.1
	20	12	6800	7500	16000	HK142012	10.5	—	—
	20	16	7300	9000	14000	HK142016	13.9	—	—
15	20	12	5800	6000	14000	HK152012	8.4	—	—
	20	16	6000	6200	14000	HK152016	11.4	—	—
	20	20	6100	6400	14000	HK152020	13.8	—	—
	21	12	7000	8400	14000	HK152112	11.1	BK152112	12.7
	21	14	8500	10400	13000	HK152114	12.7	—	—
	21	15	9100	11400	13000	HK152115	14.2	—	—
	21	16	9800	11400	14000	HK152116	15.0	BK152116	16.5
	21	22	10400	16500	14000	HK152122	20.4	BK152122	22.0
	22	12	14300	18400	13000	HK152212	12.5	—	—
	22	13	14300	18400	13000	HK152213	13.5	—	—
16	21	6	4200	5300	12000	HK162106	5.5	—	—
	21	9	4400	5600	12000	HK162109	7.5	—	—
	22	12	7100	9200	14000	HK162212	11.7	BK162212	13.8
	22	14	8800	9900	12000	HK162214	14.4	—	—



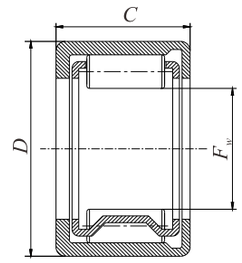
HK type with open ends



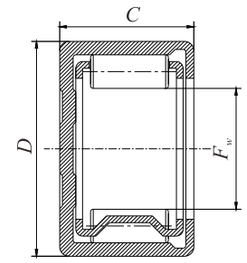
BK type with closed ends

F_w 16~22 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers and reference mass			
F_w	D	C	C_r	C_{0r}	Oil	With open ends	Weight (g)	With closed ends	Weight (g)
16	22	16	10100	14300	14000	HK162216	15.8	BK162216	17.6
	22	17	12900	17200	12000	HK162217	18.0	—	—
	22	22	11000	17400	14000	HK162222	21.7	BK162222	23.4
17	22	15	6300	8600	11000	HK172215	10.0	—	—
	23	12	6900	9300	13000	HK172312	12.2	BK172312	14.5
	23	14	6800	10200	10000	HK172314	14.0	—	—
	23	16	8500	12500	10000	HK172316	15.9	—	—
	23	18	9500	10600	10000	HK172318	19.0	—	—
	24	15	11200	12800	10000	HK172415	17.0	—	—
	25	14	13100	14700	10000	HK172514	17.7	—	—
	25	16	9320	10400	10000	HK172516	20.0	—	—
	25	18	9500	10600	11000	HK172518	23.5	—	—
20	26	10	5900	7200	10000	HK202610	11.8	BK202610	14.0
	26	11	7500	9200	9000	HK202611	12.0	—	—
	26	12	7600	10100	10000	HK202612	14.1	BK202612	16.7
	26	14	9700	18100	9000	HK202614	15.7	—	—
	26	16	11700	29100	10000	HK202616	19.3	BK202616	22.3
	26	18	7900	12800	9000	HK202618	23.3	—	—
	26	20	13700	24000	10000	HK202620	24.1	BK202620	27.1
	26	25	9100	14800	9900	HK202625	28.0	—	—
	26	30	21800	40000	10100	HK202630	34.7	BK202630	37.4
	27	18	26000	47200	9900	HK202718	78.0	—	—
	27	20	26300	47800	9900	HK202720	82.0	—	—
	27	30	28500	48800	9900	HK202730	94.0	—	—
	28	16	29600	49800	9900	HK202816	28.5	—	—
	29	18	30900	54600	9900	HK202918	41.0	—	—
22	28	10	7200	9500	10010	HK222810	12.3	—	—
	28	12	8100	10400	10010	HK222812	15.0	BK222812	18.1
	28	16	11400	18100	10010	HK222816	20.9	BK222816	24.3



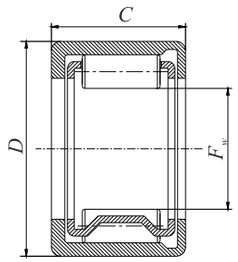
HK type with open ends



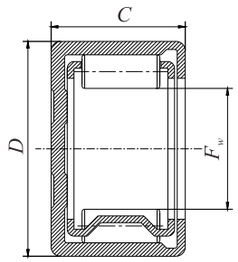
BK type with closed ends

F_w 22~30 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers and reference mass			
F_w	D	C	C_r	C_{0r}	Oil	With open ends	Weight (g)	With closed ends	Weight (g)
22	28	20	14500	25000	10010	HK222820	26.2	BK222820	29.9
	28	30	17500	30400	9000	HK222830	32.0	—	—
	29	25	18100	31500	9000	HK222925	37.0	—	—
	29	30	19400	33100	9000	HK222930	43.0	—	—
	30	14	19800	34000	9000	HK223014	21.9	—	—
25	32	12	10000	14200	9000	HK253212	20.0	BK253212	23.2
	32	14	13600	18700	9000	HK253214	21.9	—	—
	32	16	13600	20000	9000	HK253216	27.3	BK253216	31.0
	32	18	17500	25800	9000	HK253218	28.2	—	—
	32	20	17900	30000	9000	HK253220	34.1	BK253220	38.7
	32	25	22200	36700	9000	HK253225	40.0	—	—
	32	26	22500	42000	9000	HK253226	44.8	BK253226	49.0
	32	38	30000	58000	9000	HK253238	64.7	BK253238	69.0
	33	10	34800	69600	9000	HK253310	17.0	—	—
	33	15	35700	70000	9000	HK253315	27.4	—	—
	35	20	36100	78650	9000	HK253520	44.9	—	—
28	35	16	15400	22500	8700	HK283516	30.1	BK283516	34.1
	35	18	18500	29300	8700	HK283518	31.7	—	—
	35	20	18900	32000	8700	HK283520	37.6	BK283520	43.0
30	37	12	10100	16200	8100	HK303712	24.0	BK303712	27.9
	37	16	15200	27200	8100	HK303716	32.0	BK303716	37.1
	37	18	19200	31500	8100	HK303718	33.6	—	—
	37	20	19700	33500	8100	HK303720	40.1	BK303720	46.5
	37	26	24800	50000	8100	HK202626	52.9	BK202626	59.4
	37	38	32500	74000	8100	HK303738	76.1	BK303738	82.8
	38	12	38100	80000	8100	HK303812	28.0	—	—
	38	16	39000	82000	8100	HK303816	32.7	—	—
	38	24	39910	88800	8100	HK303824	49.0	—	—
	38	32	38890	88700	8100	HK303832	69.0	—	—



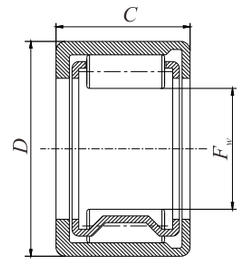
HK type with open ends



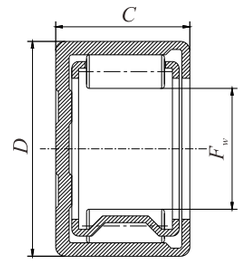
BK type with closed ends

F_w 32~55 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers and reference mass			
F_w	D	C	C_r	C_{0r}	Oil	With open ends	Weight (g)	With closed ends	Weight (g)
32	38	11	19700	43200	7800	HK323811	17.0	—	—
	39	24	25500	52000	7300	HK323924	50.7	—	—
	39	32	22600	54300	7100	HK323932	66.4	—	—
	40	32	27990	59890	7100	HK324032	72.7	—	—
35	42	12	12100	19300	7100	HK354212	27.7	BK354212	32.9
	42	16	15700	27500	7100	HK354216	36.9	BK354216	43.8
	42	20	20800	41000	7100	HK354220	46.1	BK354220	54.8
	43	16	24200	47100	6200	HK354316	37.0	—	—
	43	25	24440	48200	6200	HK354325	60.5	—	—
	43	32	24870	48880	6200	HK354332	80.0	—	—
	45	12	24870	48880	6200	HK354512	31.0	—	—
40	47	12	14000	24300	6300	HK404712	31.1	BK404712	38.2
	47	16	20000	38500	6300	HK404716	41.4	BK404716	51.0
	47	20	25500	52000	6300	HK404720	51.8	BK404720	62.0
	50	32	23000	42000	6000	HK405032	114.3	—	—
	50	38	24100	43000	6000	HK405038	130.8	—	—
45	52	12	12900	22500	5800	HK455212	34.8	BK455212	45.0
	52	16	19300	38000	5800	HK455216	46.2	BK455216	56.0
	52	20	22000	51000	5800	HK455220	56.0	BK455220	72.0
	55	38	27600	61000	5300	HK455538	135.0	—	—
50	57	16	15200	32500	5300	HK505716	51.2	—	—
	58	12	23600	57200	5300	HK505812	44.2	—	—
	58	20	28000	60000	5300	HK505820	72.0	BK505820	87.3
	58	25	34500	80000	5300	HK505825	90.1	BK505825	109.0
	60	38	27770	63100	4600	HK506038	140.0	—	—
55	63	20	29500	59900	4600	HK556320	78.0	BK556320	93.8
	63	25	33500	69980	4600	HK556325	109.0	—	—
	63	28	39090	98000	4600	HK556328	111.0	BK556328	132.0



HK type with open ends

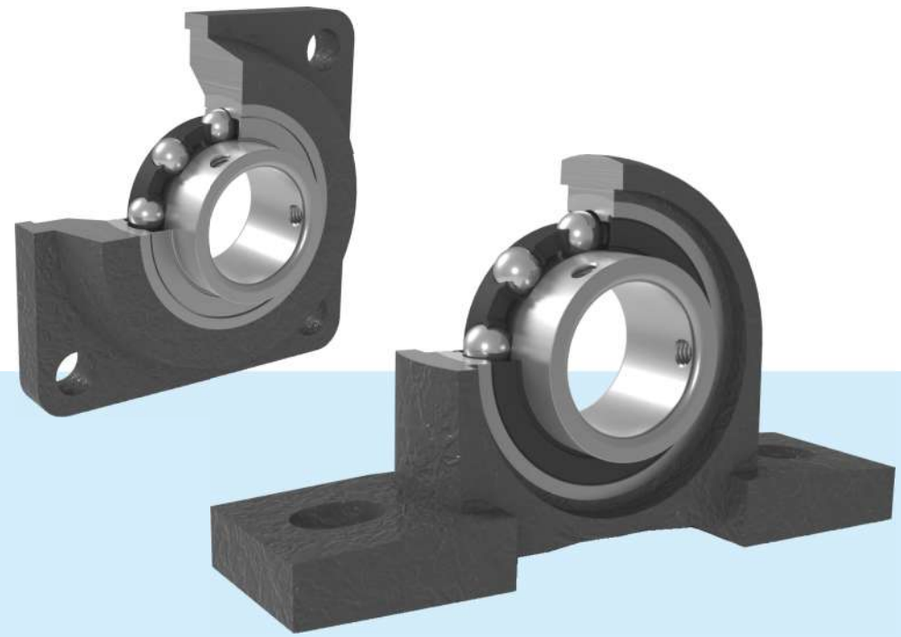


BK type with closed ends

F_w 60 mm

Boundary dimensions (mm)			Basic load ratings (N)		Limiting speeds (r/min)	Bearing Numbers and reference mass			
F_w	D	C	C_r	C_{0r}	Oil	With open ends	Weight (g)	With closed ends	Weight (g)
60	68	12	12400	29000	4100	HK606812	49.2	BK606812	77.0
	68	20	30500	72000	4100	HK606820	86.0	BK606820	105.0
	68	32	50000	131000	4100	HK606832	136.0	BK606832	164.0

Insert ball bearing unit



Insert ball bearing unit

Insert ball bearing unit

Insert ball bearing units are composed of an insert bearing with a seal on both sides and a cast (or steel plate stamped) bearing housing. The inner structure of the insert bearing is the same as that of the deep groove ball bearing, but the outer ring of the insert bearing has a convex spherical outer surface, which allows for automatic self-alignment when matching with the concave sphere of the bearing housing. Usually there is a clearance between the inner bore and the shaft of this kind of bearing. The inner ring of the bearing is fixed on the shaft with screw locking, eccentric collar locking or adapter locking, and rotates with the shaft. This kind of bearing is compact in structure, easy to be assemble and disassemble, and suitable for simple support. It is often used in mining, metallurgy, agriculture, chemical and transportation machinery.

1. Structure of insert bearing

(1) Screw locking

There are two types: UC type with a broadside inner ring and UB type with a flat head on the one side of inner ring. Bearings with screw locking are applicable for the situation where the rotation direction is changeable.

(2) Eccentric collar locking

There are two types: UEL type with a broadside inner ring and UE type with a flat head on the one side of inner ring. Bearings with eccentric collar locking are applicable for the situation where the rotation direction is consistent.

(3) Adapter locking

UK+H type: featured by wider inner rings, tapered internal bores. These are applicable for situation where rotational direction is variable, rotation speed is high and running is stable.

2. Structure of housing

Casting housing has vertical type, square type, rhombic type, round-flanged type, ring type and sliding block, etc. Pressed housing has vertical type, round type, triangular type, rhombic type, etc. The same insert bearing with housing may have multiple variants due to structural variation, change of lubrication mode and sealing methods.

3. Cage material

Basically the same as deep groove ball bearings

4. Allow misalignment angle

The maximal permitted deflection between the insert bearing and central axis is generally 5° . If additional lubricating grease is needed during the running, the angle of declination shall not exceed 2° .

5. Tolerance and clearance

The tolerance of inner ring of insert bearing is different from that of deep groove ball bearing. Its value shall conform to the provisions of Table 1 or Table 2, tolerance of outer ring shall conform to the provisions of Table 3 and the dimensional tolerance of eccentric collar shall conform to the provisions of Table 4. The radial clearance of the insert bearing is usually larger than that of the deep-groove ball bearing of the same size. The radial clearance value of the cylindrical bore insert ball bearing shall comply with the provisions of Table 5, and the radial clearance value of the tapered bore insert ball bearing with outer cone hole shall comply with the provisions of Table 6.

Table 1 Cylindrical bore inner ring tolerance

unit:μm

d (mm)		Δ_{dmp}		V_{dp}	Δ_{Hs}		Δ_{Bs}		K_{ia}
Over	Up to	Upper deviation	Lower deviation	Max	Upper deviation	Lower deviation	Upper deviation	Lower deviation	Max
10	18	+15	0	10	+100	-100	0	-120	12
18	30	+18	0	12	+100	-100	0	-120	15
30	50	+21	0	14	+100	-100	0	-120	18
50	80	+14	0	16	+100	-100	0	-150	22
80	120	+28	0	19	+100	-100	0	-200	28
120	180	+33	0	22	+100	-100	0	-250	35

Note: Inner bore can be chromed to reduce the rust during running. The tolerances listed in the table are applicable for inner bore surfaces with or without chrome.

Table 2 Tapered bore inner ring tolerance

unit:μm

d (mm)		Δ_{dmp}		$\Delta_{d1mp} - \Delta_{dmp}$	
Over	Up to	Upper deviation	Lower deviation	Upper deviation	Lower deviation
10	18	+27	0	+18	0
18	30	+33	0	+21	0
30	50	+39	0	+25	0
50	80	+46	0	+30	0
80	120	+54	0	+35	0
120	180	+63	0	+40	0

Table 3 Outer ring tolerance

unit:μm

D (mm)		Δ_{Dmp}		K_{ea}
Over	Up to	Upper deviation	Lower deviation	Max
30	50	0	-11	20
50	80	0	-13	25
80	120	0	-15	35
120	150	0	-18	40
150	180	0	-25	45
180	250	0	-30	50
250	315	0	-35	60

Note: The lower deviation of $\triangle_{Dmp}$ is not aplicable to the area within 1/4 width away from the end face.

Table 4 Eccentric collar

Unit:μm

d(mm)		Δ_{ds}		Δ_{d2s}		Δ_{Hs}		Δ_{B2s}		Δ_{A1s}	
Over	Up to	Upper deviation	Lower deviation	Upper deviation	Lower deviation	Upper deviation	Lower deviation	Upper deviation	Lower deviation	Upper deviation	Lower deviation
10	35	+250	+25	+300	0	+100	−100	+270	−270	0	−180
35	55	+300	+25	+300	0	+100	−100	+330	−330	0	−180
55	80	+300	+25	+400	0	+100	−100	+330	−330	0	−220

Table 5 Cylindrical bore

Unit:μm

Bearing nominal bore diameter d (mm)		2, 3 series					
		Group 2		Group 0		Group 3	
Over	Up to	Min	Max	Min	Max	Min	Max
10	18	3	18	10	25	18	33
18	24	5	20	12	28	20	36
24	30	5	20	12	28	23	41
30	40	6	20	13	33	28	46
40	50	6	23	14	36	30	51
50	65	8	28	18	43	38	61
65	80	10	30	20	51	46	71
80	100	12	36	24	58	53	84
100	120	15	41	28	66	61	97
120	140	18	48	33	81	71	114

Table 6 Tapered bore

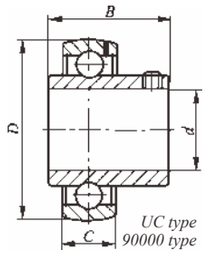
Unit:μm

Bearing nominal bore diameter d (mm)		2, 3 series					
		Group 2		Group 0		Group 3	
Over	Up to	Min	Max	Min	Max	Min	Max
10	18	10	25	18	33	25	45
18	24	12	28	20	36	28	48
24	30	12	28	23	41	30	53
30	40	13	33	28	46	40	64
40	50	14	36	30	51	45	73
50	65	18	43	38	61	55	90
65	80	20	51	46	71	65	105
80	100	24	58	53	84	75	120
100	120	28	66	61	97	90	140
120	140	33	81	71	114	105	160

6. Load capacity

The loading capacity of the insert bearing is almost the same as that of deep groove ball bearings, and the calculation methods of their equivalent loads are also the same. The loading capacity of insert bearing with housing also depends on the housing type or fixing method. Insert bearing with cast housing can take full advantage of the bearing ‘s loading capacity, but axial load capacity depends on fastening of inner ring and shaft. When the bearing is fastened only with the screw lock and eccentric collar on the shaft, the allowable axial load shall not exceed the 20% of dynamic load rating, and clamp device such as shaft shoulder needs to be added onto the shaft.

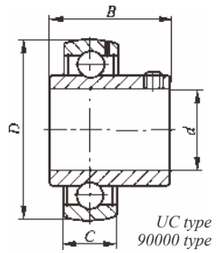
UC2



d 12~90mm

Boundary dimensions (mm)				Basic load ratings (kN)		Nominal numbers	Nominal numbers (old)	Reference mass (kg)
d	D	B	C	C_r	C_{0r}			
12	40	27.4	14.0	12.8	6.6	**UC201**	**90501**	0.09
15	40	27.4	14.0	12.8	6.6	**UC202**	**90502**	0.11
17	40	27.4	14.0	12.8	6.6	**UC203**	**90503**	0.15
20	47	31.0	16.0	12.8	6.6	**UC204**	**90504**	0.17
25	52	34.1	17.0	14.0	7.9	**UC205**	**90505**	0.21
30	62	38.1	19.0	19.5	11.3	**UC206**	**90506**	0.32
35	72	42.9	20.0	25.7	15.3	**UC207**	**90507**	0.47
40	80	49.2	21.0	29.1	17.9	**UC208**	**90508**	0.64
45	85	49.2	22.0	31.5	20.4	**UC209**	**90509**	0.68
50	90	51.6	23.0	43.5	23.2	**UC210**	**90510**	0.80
55	100	55.6	25.0	43.5	29.3	**UC211**	**90511**	1.12
60	110	65.1	27.0	52.5	36.0	**UC212**	**90512**	1.54
65	120	65.1	28.0	57.5	40.0	**UC213**	**90513**	1.86
70	125	74.6	30.0	62.0	44.0	**UC214**	**90514**	2.05
75	130	77.8	30.0	66.0	49.5	**UC215**	**90515**	2.21
80	140	82.6	33.0	72.5	53.0	**UC216**	**90516**	2.79
85	150	85.7	35.0	84.0	62.0	**UC217**	**90517**	3.38
90	160	96.0	37.0	96.0	71.5	**UC218**	**90518**	4.45

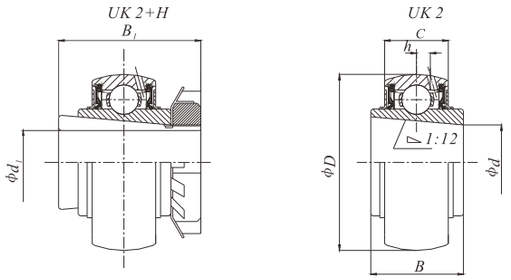
UC3



d 25~120mm

Boundary dimensions (mm)				Basic load ratings (kN)		Nominal numbers	Nominal numbers (old)	Reference mass (kg)
d	D	B	C	C_r	C_{0r}			
25	62	38	22	22.4	11.5	**UC305**	**90605**	0.45
30	72	43	24	28.1	15.8	**UC306**	**90606**	0.56
35	80	48	25	33.4	19.2	**UC307**	**90607**	0.71
40	90	52	27	40.7	24.0	**UC308**	**90608**	1.00
45	100	57	30	52.8	31.8	**UC309**	**90609**	1.33
50	110	61	32	61.8	37.9	**UC310**	**90610**	1.67
55	120	66	34	71.6	44.8	**UC311**	**90611**	2.10
60	130	71	36	81.8	51.8	**UC312**	**90612**	2.62
65	140	75	38	93.8	60.5	**UC313**	**90613**	3.19
70	150	78	40	105.0	68.0	**UC314**	**90614**	3.88
75	160	82	42	112.0	76.8	**UC315**	**90615**	4.68
80	170	86	44	122.0	86.5	**UC316**	**90616**	5.50
85	180	96	46	132.0	96.5	**UC317**	**90617**	6.67
90	190	96	48	145.0	108.0	**UC318**	**90618**	7.50
95	200	103	50	155.0	122.0	**UC319**	**90619**	8.80
100	215	108	54	172.0	140.0	**UC320**	**90620**	10.94
110	240	117	60	205.0	178.0	**UC322**	**90622**	14.50
120	260	126	64	228.0	208.0	**UC324**	**90624**	18.75

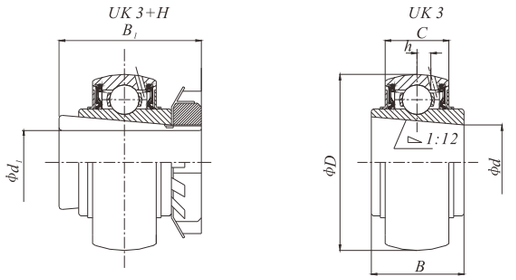
UK 2



d 25~90mm

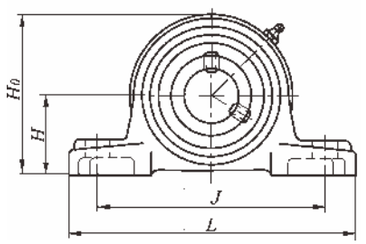
Boundary dimensions (mm)				Basic load ratings (kN)		Nominal numbers	Nominal numbers (old)	Reference mass (kg)
d	D	B_1	C	C_r	C_{0r}			
25	52	35	17	14.0	7.9	UK205+H2305	290505	0.25
30	62	38	19	19.5	11.3	UK206+H2306	290506	0.36
35	72	43	20	25.7	15.3	UK207+H2307	290507	0.54
40	80	46	21	29.1	17.9	UK208+H2308	290508	0.74
45	85	50	22	31.5	20.4	UK209+H2309	290509	0.83
50	90	55	24	35.0	23.2	UK210+H2310	290510	0.97
55	100	59	25	43.5	29.3	UK211+H2311	290511	1.26
60	110	62	27	52.5	36.0	UK212+H2312	290512	1.59
65	120	65	27	57.5	40.0	UK213+H2313	290513	2.00
75	130	73	30	66.0	49.5	UK215+H2315	290515	2.56
80	140	78	33	72.5	53.0	UK216+H2316	290516	3.23
85	150	82	36	84.0	62.0	UK217+H2317	290517	3.93
90	160	86	37	96.0	71.5	UK218+H2318	290518	4.74

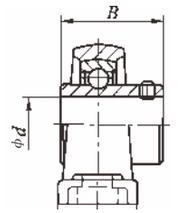
UK 3



d 25~120mm

Boundary dimensions (mm)				Basic load ratings (kN)		Nominal numbers	Nominal numbers (old)	Reference mass (kg)
d	D	B	C	C_r	C_{0r}			
25	62	35	21	22.4	11.5	UK305+H2305	290605	0.36
30	72	38	23	28.1	15.8	UK306+H2306	290606	0.59
35	80	43	25	33.4	19.2	UK307+H2307	290607	0.75
40	90	46	27	40.7	24.0	UK308+H2308	290608	1.02
45	100	50	30	52.8	31.8	UK309+H2309	290609	1.38
50	110	55	32	61.8	37.9	UK310+H2310	290610	1.68
55	120	59	34	71.6	44.8	UK311+H2311	290611	2.06
60	130	62	36	81.8	51.8	UK312+H2312	290612	2.53
65	140	65	38	93.8	60.5	UK313+H2313	290613	3.08
75	160	73	42	112.0	76.8	UK315+H2315	290615	4.84
80	170	78	44	122.0	86.5	UK316+H2316	290616	5.75
85	180	82	46	132.0	96.5	UK317+H2317	290617	6.72
90	190	86	48	145.0	108.0	UK318+H2318	290618	7.87
95	200	90	50	155.0	122.0	UK319+H2319	290619	9.02
100	215	97	54	172.0	140.0	UK320+H2320	290620	11.1
110	240	105	60	205.0	178.0	UK322+H2322	290622	14.9
120	260	112	64	228.0	208.0	UK324+H2324	290624	18.0



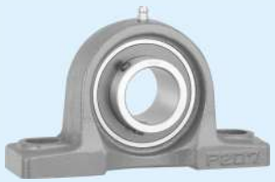


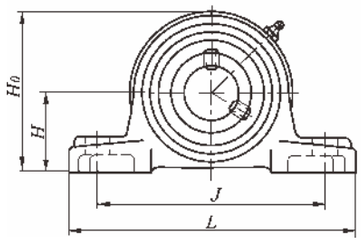
UCP type
Z 90000 type

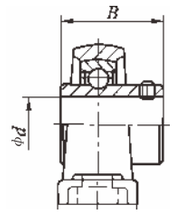
d 12~100 mm

Boundary dimensions (mm)						Mounting bolt specification	Basic load ratings (kN)		Nominal numbers		Nominal numbers (old)	Reference mass (kg)
d	H	L	J	Ho	B		C_r	C_{or}				
12	30.2	127.0	96.0	62.0	27.4	M10	12.8	6.6	**UCP201**		**Z90501**	0.7
15	30.2	127.0	96.0	62.0	27.4	M10	12.8	6.6	**UCP202**		**Z90502**	0.7
17	30.2	127.0	96.0	62.0	27.4	M10	12.8	6.6	**UCP203**		**Z90503**	0.7
20	33.3	127.0	96.0	65.0	31.0	M10	12.8	6.6	**UCP204**		**Z90504**	0.7
25	36.5	140.0	105.0	71.0	34.1	M10	14.0	7.9	**UCP205**		**Z90505**	0.8
30	42.9	165.0	121.0	83.0	38.1	M14	19.5	11.3	**UCP206**		**Z90506**	1.3
35	47.6	167.0	126.0	93.0	42.9	M14	25.7	15.3	**UCP207**		**Z90507**	1.6
40	49.2	184.0	136.0	100.0	49.2	M14	29.1	17.9	**UCP208**		**Z90508**	1.9
45	54.0	190.0	146.0	106.0	49.2	M14	31.5	20.4	**UCP209**		**Z90509**	2.2
50	57.2	206.0	159.0	114.0	51.6	M16	35.0	23.2	**UCP210**		**Z90510**	2.6
55	63.5	219.0	172.0	126.0	55.6	M16	43.5	29.3	**UCP211**		**Z90511**	3.3
60	69.8	241.0	186.0	138.0	65.1	M16	52.5	36.0	**UCP212**		**Z90512**	4.6
65	76.2	265.0	203.0	151.0	65.1	M20	57.5	40.0	**UCP213**		**Z90513**	5.9
70	79.4	266.0	210.0	157.0	74.6	M20	62.0	44.0	**UCP214**		**Z90514**	6.6
75	82.6	275.0	217.0	163.0	77.8	M20	66.0	49.5	**UCP215**		**Z90515**	7.4
80	88.9	292.0	232.0	175.0	82.6	M20	72.5	53.0	**UCP216**		**Z90516**	9.0
85	95.2	310.0	247.0	187.0	85.7	M20	84.0	62.0	**UCP217**		**Z90517**	11.0
90	101.6	327.0	262.0	200.0	96.0	M22	96.0	71.5	**UCP218**		**Z90518**	13.0
100	115.0	380.0	308.0	225.0	108	—	—	—	**UCP220**		**Z90520**	16.0

UCP 3



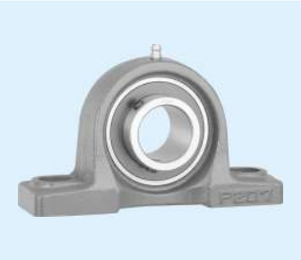


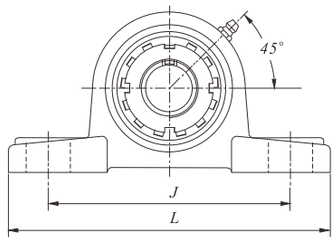


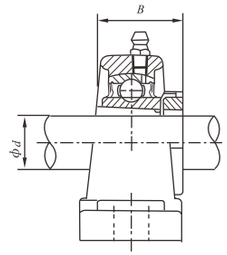
UCP type
Z 90000 type

d 25~120 mm

Boundary dimensions (mm) d	H	L (Max)	J	Ho	B	Mounting bolt specification	Basic load ratings (kN) C_r	C_{or}	Nominal numbers		Nominal numbers (old)	Reference mass (kg)
25	45	175	132.0	85	38	M8X1	22.4	11.5	**UCP305**		**Z90605**	1.4
30	50	180	140.0	95	43	M8X1	28.1	15.8	**UCP306**		**Z90606**	1.8
35	56	210	160.0	106	48	M8X1	33.4	19.2	**UCP307**		**Z90607**	2.8
40	60	220	170.0	116	52	M10X1.25	40.7	24.0	**UCP308**		**Z90608**	3.0
45	67	245	190.0	129	57	M10X1.25	52.8	31.8	**UCP309**		**Z90609**	4.1
50	75	275	212.0	143	61	M12X1.5	61.8	37.9	**UCP310**		**Z90610**	5.9
55	80	310	236.0	154	66	M12X1.5	71.6	44.8	**UCP311**		**Z90611**	7.4
60	85	330	250.0	165	71	M12X1.5	81.8	51.8	**UCP312**		**Z90612**	9.4
65	90	340	260.0	176	75	M12X1.5	93.8	60.5	**UCP313**		**Z90613**	10.0
70	95	360	280.0	187	78	M12X1.5	105.0	68.0	**UCP314**		**Z90614**	12.0
75	100	380	290.0	198	82	M14X1.5	112.0	76.8	**UCP315**		**Z90615**	14.0
80	106	400	300.0	210	86	M14X1.5	122.0	86.5	**UCP316**		**Z90616**	18.0
85	112	420	320.0	220	96	M16X1.5	132.0	96.5	**UCP317**		**Z90617**	20.0
90	118	430	330.0	235	96	M16X1.5	145.0	108.0	**UCP318**		**Z90618**	24.0
95	125	470	360.0	250	103	M16X1.5	155.0	122.0	**UCP319**		**Z90619**	29.0
100	140	490	380.0	275	108	M18X1.5	172.0	140.0	**UCP320**		**Z90620**	35.0
110	150	520	400.0	300	117	M18X1.5	205.0	178.0	**UCP322**		**Z90622**	45.0
120	160	570	450.0	320	126	M18X1.5	228.0	208.0	**UCP324**		**Z90624**	55.0



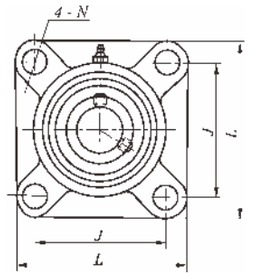


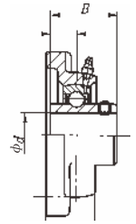


d **25~140 mm**

Boundary dimensions (mm) d	L	J	B	Mounting bolt specification	Basic load ratings (kN) C_r	C_{0r}	Nominal numbers		Reference mass (kg)
25	140	105	35	M10	14.0	7.9	UKP205+H2305		0.87
30	165	121	38	M14	19.5	11.3	UKP206+H2306		1.44
35	167	127	43	M14	25.7	15.3	UKP207+H2307		1.78
40	184	137	46	M14	29.1	17.8	UKP208+H2308		2.20
45	190	146	50	M14	31.5	20.4	UKP209+H2309		2.40
50	206	159	55	M16	35.0	23.2	UKP210+H2310		2.90
55	219	171	59	M16	43.5	29.3	UKP211+H2311		3.50
60	241	184	62	M16	52.5	36.0	UKP212+H2312		4.80
65	265	203	65	M20	57.5	40.0	UKP213+H2313		5.70
75	275	217	73	M20	66.0	49.5	UKP215+H2315		7.50
75	380	290	73	M22	113.0	77.0	UKP315+H2315		14.7
80	400	300	78	M22	123.0	86.5	UKP316+H2316		18.3
85	420	320	82	M27	133.0	97.0	UKP317+H2317		20.5
90	430	330	86	M27	143.0	107.0	UKP318+H2318		23.0
95	470	360	90	M30	153.0	119.0	UKP319+H2319		29.0
100	490	380	97	M30	173.0	141.0	UKP320+H2320		35.0
110	520	400	105	M33	205.0	179.0	UKP322+H2322		45.0
120	570	450	112	M33	207.0	185.0	UKP324+H2324		60.0
130	600	480	121	M33	229.0	214.0	UKP326+H2326		75.0
140	620	500	131	M33	253.0	246.0	UKP328+H2328		90.0

UCFU 2



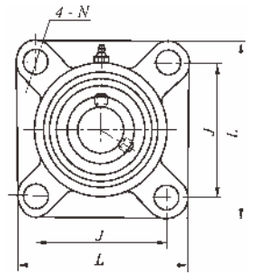


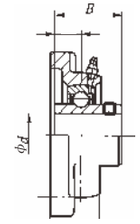
UCFU type
F 90000 type

d 12~100 mm

Boundary dimensions (mm) d	L	J	B	Mounting bolt specification	Basic load ratings (kN) C_r	C_{0r}	Nominal numbers	Nominal numbers (old)	Reference mass (kg)
12	78	54.0	27.4	M10	12.8	6.6	UCFU201	F90501	0.7
15	78	54.0	27.4	M10	12.8	6.6	UCFU202	F90502	0.7
17	78	54.0	27.4	M10	12.8	6.6	UCFU203	F90503	0.6
20	88	63.5	31.0	M10	12.8	6.6	UCFU204	F90504	0.7
25	97	70.0	34.1	M10	14.0	7.9	UCFU205	F90505	0.9
30	110	82.5	38.1	M10	19.5	11.3	UCFU206	F90506	1.1
35	119	92.0	42.9	M12	25.7	15.3	UCFU207	F90507	1.5
40	132	101.5	49.2	M14	29.1	17.9	UCFU208	F90508	1.9
45	139	105.0	49.2	M14	31.5	20.4	UCFU209	F90509	2.3
50	145	111.0	51.6	M14	35.0	23.2	UCFU210	F90510	2.7
55	164	130.0	55.6	M16	43.5	29.3	UCFU211	F90511	3.9
60	177	143.0	65.1	M16	52.5	36.0	UCFU212	F90512	4.7
65	189	149.5	65.1	M16	57.5	40.0	UCFU213	F90513	5.7
70	195	152.0	74.6	M16	62.0	44.0	UCFU214	F90514	6.1
75	202	159.0	77.8	M16	66.0	49.5	UCFU215	F90515	6.9
80	213	165.0	82.6	M20	72.5	53.0	UCFU216	F90516	8.1
85	222	175.0	85.7	M20	84.0	62.0	UCFU217	F90517	9.3
90	240	187.0	96.0	M20	96.0	71.5	UCFU218	F90518	11.0
100	270	210.0	108.0	—	—	—	UCFU220	F90520	12.0

UCFU 3



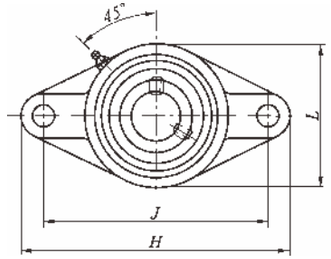


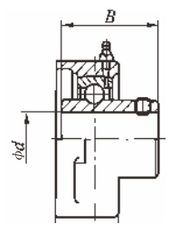
UCFU type
F 90000 type

d 25~120 mm

Boundary dimensions (mm) d	L (Max)	J	B	Mounting bolt specification	Basic load ratings (kN) C_r	C_{0r}	Nominal numbers	Nominal numbers (old)	Reference mass (kg)
25	110	80	38	M8X1	22.4	11.5	UCFU305	F90605	1.1
30	125	95	43	M8X1	28.1	15.8	UCFU306	F90606	1.6
35	135	100	48	M8X1	33.4	19.2	UCFU307	F90607	2.0
40	150	112	52	M10X1.25	40.7	24.0	UCFU308	F90608	2.7
45	160	125	57	M10X1.25	52.8	31.8	UCFU309	F90609	3.4
50	175	132	61	M12X1.5	61.8	37.9	UCFU310	F90610	4.5
55	185	140	66	M12X1.5	71.6	44.8	UCFU311	F90611	5.5
60	195	150	71	M12X1.5	81.8	51.8	UCFU312	F90612	6.5
65	208	166	75	M12X1.5	93.8	60.5	UCFU313	F90613	7.9
70	226	178	78	M12X1.5	105.0	68.0	UCFU314	F90614	9.5
75	250	184	82	M14X1.5	112.0	76.8	UCFU315	F90615	12.0
80	260	196	86	M14X1.5	122.0	86.5	UCFU316	F90616	14.0
85	280	204	96	M16X1.5	132.0	96.5	UCFU317	F90617	16.0
90	290	216	96	M16X1.5	145.0	108.0	UCFU318	F90618	19.0
95	310	228	103	M16X1.5	155.0	122.0	UCFU319	F90619	22.0
100	340	242	108	M18X1.5	172.0	140.0	UCFU320	F90620	26.0
110	370	266	117	M18X1.5	205.0	178.0	UCFU322	F90622	38.0
120	260	290	126	M18X1.5	228.0	208.0	UCFU324	F90624	50.0

UCFLU 2



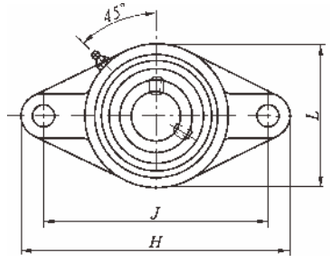


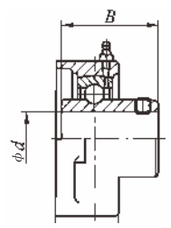
UCFLU type
L 90000 type

d 12~60 mm

d	Boundary dimensions (mm) H (Max)	L (Max)	J	B	Mounting bolt specification	Basic load ratings (kN) C_r	C_{0r}	Nominal numbers		Nominal numbers (old)	Reference mass (kg)
12	99	61	76.5	27.4	M10	12.8	6.6	**UCFLU201**		**L90501**	0.45
15	99	61	76.5	27.4	M10	12.8	6.6	**UCFLU202**		**L90502**	0.45
17	99	61	76.5	27.4	M10	12.8	6.6	**UCFLU203**		**L90503**	0.45
20	113	62	90	31.0	M10	12.8	6.6	**UCFLU204**		**L90504**	0.5
25	125	70	99	34.1	M14	14	7.85	**UCFLU205**		**L90505**	0.6
30	142	83	116.5	38.1	M14	19.5	11.3	**UCFLU206**		**L90506**	0.9
35	156	96	130	42.9	M14	25.7	15.3	**UCFLU207**		**L90507**	1.2
40	172	105	143.5	49.2	M14	29.1	17.9	**UCFLU208**		**L90508**	1.6
45	180	112	148.5	49.2	M16	31.5	20.4	**UCFLU209**		**L90509**	1.9
50	190	117	157	51.6	M16	35	23.2	**UCFLU210**		**L90510**	2.2
55	222	134	184	55.6	M16	43.5	29.3	**UCFLU211**		**L90511**	3.1
60	238	142	202	65.1	M20	52.5	36	**UCFLU212**		**L90512**	4

UCFLU 3



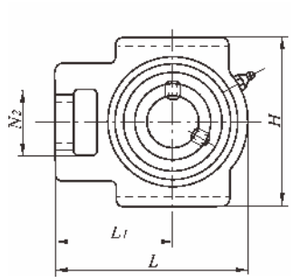


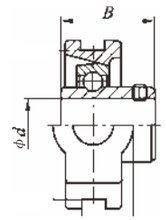
UCFLU type
L 90000 type

d 25~120 mm

d	Boundary dimensions (mm) H (Max)	J	L (Max)	B	Mounting bolt specification	Basic load ratings (kN) C_r	C_{0r}	Nominal numbers		Nominal numbers (old)	Reference mass (kg)
25	150	113	80	38	M8X1	22.4	11.5	**UCFLU305**		**L90605**	1.10
30	180	134	90	43	M8X1	28.1	15.8	**UCFLU306**		**L90606**	1.50
35	185	141	100	48	M8X1	33.4	19.2	**UCFLU307**		**L90607**	1.90
40	200	158	112	52	M10X1.25	40.7	24.0	**UCFLU308**		**L90608**	2.50
45	230	177	125	57	M10X1.25	52.8	31.8	**UCFLU309**		**L90609**	3.40
50	240	187	140	61	M12X1.5	61.8	37.9	**UCFLU310**		**L90610**	4.40
55	250	198	150	66	M12X1.5	71.6	44.8	**UCFLU311**		**L90611**	5.10
60	270	212	160	71	M12X1.5	81.8	51.8	**UCFLU312**		**L90612**	6.10
65	295	240	175	75	M12X1.5	93.8	60.5	**UCFLU313**		**L90613**	7.80
70	315	250	185	78	M12X1.5	105.0	68.0	**UCFLU314**		**L90614**	9.00
75	320	260	195	82	M14X1.5	112.0	76.8	**UCFLU315**		**L90615**	10.00
80	355	285	210	86	M14X1.5	122.0	86.5	**UCFLU316**		**L90616**	13.00
85	370	300	220	96	M16X1.5	132.0	96.5	**UCFLU317**		**L90617**	15.00
90	385	315	235	96	M16X1.5	145.0	108.0	**UCFLU318**		**L90618**	18.00
95	405	330	250	103	M16X1.5	155.0	122.0	**UCFLU319**		**L90619**	22.00
100	440	360	270	108	M18X1.5	172.0	140.0	**UCFLU320**		**L90620**	27.00
110	470	390	300	117	M18X1.5	205.0	178.0	**UCFLU322**		**L90622**	33.00
120	520	430	330	126	M18X1.5	228.0	208.0	**UCFLU324**		**L90624**	48.00

UCK2



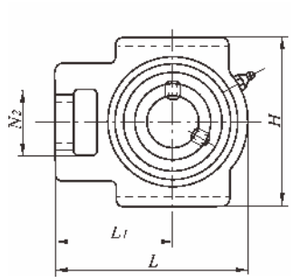


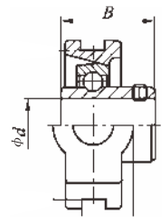
UCK type
UCT type
K 90000 type

d 12~60mm

Boundary dimensions (mm)						Basic load ratings (kN)		Nominal numbers		Nominal numbers (old)	Reference mass (kg)
d	H	L	L_1	N_2	B	C_r	C_{0r}				
12	89	94	61	32	31	12.8	6.6	**UCK201**		**K90501**	0.8
15	89	94	61	32	31	12.8	6.6	**UCK202**		**K90502**	0.8
17	89	94	61	32	31	12.8	6.6	**UCK203**		**K90503**	0.8
20	89	94	61	32	31	12.8	6.6	**UCK204**		**K90504**	0.8
25	89	97	62	32	34	14	7.85	**UCK205**		**K90505**	1.1
30	102	113	70	37	38.1	19.5	11.3	**UCK206**		**K90506**	1.3
35	102	129	78	37	42.9	25.7	15.3	**UCK207**		**K90507**	1.7
40	114	143	88	49	49.2	29.1	17.9	**UCK208**		**K90508**	2.4
45	117	144	87	49	49.2	31.5	20.4	**UCK209**		**K90509**	2.5
50	117	149	90	49	51.6	35	23.2	**UCK210**		**K90510**	2.6
55	146	171	106	64	55.6	43.5	29.3	**UCK211**		**K90511**	4
60	146	194	119	64	65.1	52.5	36	**UCK212**		**K90512**	4.9

UCK3



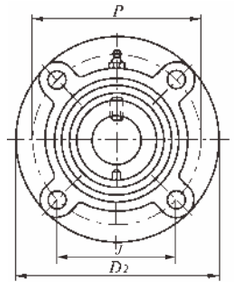


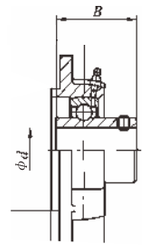
UCK type
UCT type
K 90000 type

d 25~120 mm

Boundary dimensions (mm)						Basic load ratings (kN)		Nominal numbers		Nominal numbers (old)	Reference mass (kg)
d	H	L	L_1	N_2	B	C_r	C_{0r}				
25	89	122	76	36	38	22.4	11.5	**UCK305**		**K90605**	1.4
30	100	137	85	41	43	28.1	15.8	**UCK306**		**K90606**	1.8
35	111	150	94	45	48	33.4	19.2	**UCK307**		**K90607**	2.4
40	124	162	100	50	52	40.7	24.0	**UCK308**		**K90608**	3.0
45	138	178	110	55	57	52.8	31.8	**UCK309**		**K90609**	4.0
50	151	191	117	61	61	61.8	37.9	**UCK310**		**K90610**	5.0
55	163	207	127	66	66	71.6	44.8	**UCK311**		**K90611**	6.4
60	178	220	135	71	71	81.8	51.8	**UCK312**		**K90612**	7.6
65	190	238	146	70	75	93.8	60.5	**UCK313**		**K90613**	9.7
70	202	252	155	85	78	105.0	68.0	**UCK314**		**K90614**	11.0
75	216	262	160	85	82	112.0	76.8	**UCK315**		**K90615**	14.0
80	230	282	174	98	86	122.0	86.5	**UCK316**		**K90616**	16.0
85	240	298	183	98	96	132.0	96.5	**UCK317**		**K90617**	20.0
90	255	312	192	106	96	145.0	108.0	**UCK318**		**K90618**	22.0
95	270	322	197	106	103	155.0	122.0	**UCK319**		**K90619**	25.0
100	290	345	210	115	108	172.0	140.0	**UCK320**		**K90620**	32.0
110	320	385	235	125	117	205.0	178.0	**UCK322**		**K90622**	40.0
120	355	432	267	140	126	228.0	208.0	**UCK324**		**K90624**	55.0

UCFC



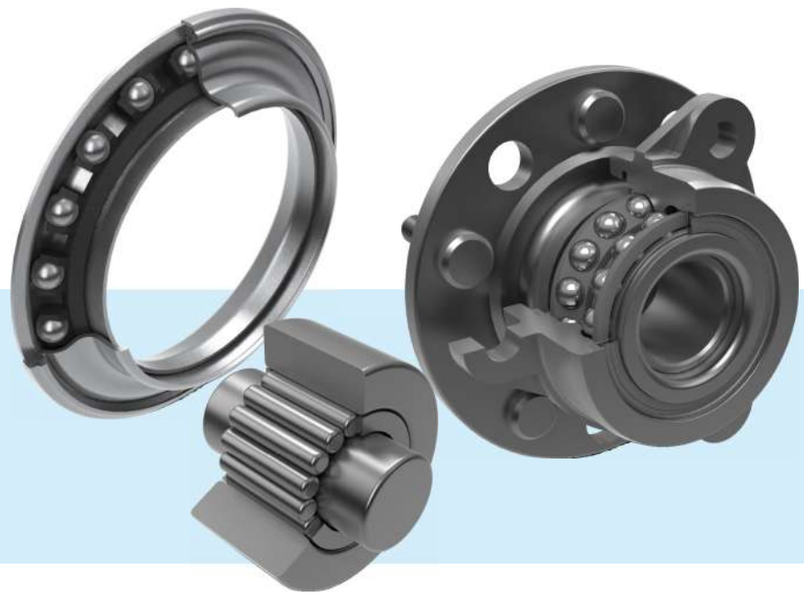


UCKC type
TY 90000 type

d 12~90 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Mounting bolt specification	Nominal numbers		Nominal numbers (old)	Reference mass (kg)
d	D_2	P	J	B	C_r	C_{0r}					
12	97	75	53.0	27.4	12.8	6.6	M10	UCFC201		TY90501	0.76
15	97	75	53.0	27.4	12.8	6.6	M10	UCFC202		TY90502	0.76
17	97	75	53.0	27.4	12.8	6.6	M10	UCFC203		TY90503	0.76
20	100	78	55.1	31.0	12.8	6.6	M10	UCFC204		TY90504	0.76
25	115	90	63.6	34.1	14	7.85	M14	UCFC205		TY90505	0.96
30	125	100	70.7	38.1	19.5	11.3	M14	UCFC206		TY90506	1.3
35	135	110	77.8	42.9	25.7	15.3	M14	UCFC207		TY90507	1.7
40	145	120	84.8	49.2	29.1	17.9	M14	UCFC208		TY90508	2
45	160	132	93.3	49.2	31.5	20.4	M16	UCFC209		TY90509	2.7
50	165	138	97.6	51.6	35	23.2	M16	UCFC210		TY90510	2.9
55	185	150	106.1	55.6	43.5	29.3	M16	UCFC211		TY90511	4.2
60	195	160	113.1	65.1	52.5	36	M20	UCFC212		TY90512	5
65	205	170	120.2	65.1	57.5	40	M20	UCFC213		TY90513	5.7
70	215	177	125.1	74.6	62	44	M20	UCFC214		TY90514	6.8
75	220	184	130.1	77.8	66	49.5	M20	UCFC215		TY90515	7.2
80	240	200	141.1	82.6	72.5	53	M20	UCFC216		TY90516	8.7
85	250	208	147.1	85.7	84	62	M20	UCFC217		TY90517	10.3
90	265	220	155.5	96.0	96	71.5	M22	UCFC218		TY90518	13.5

Automotive bearing



Automotive bearing

SA series automobile alternator bearings

Automotive alternators have long term exposure to brush wear dust, external dust as well as muddy water. When alternators operate under high temperature and high load, the requirements for bearings such as high reliability, long fatigue life, good sealing performance, high temperature resistance, etc., are increased.

Special raw materials and heat treatment, excellent sealing structure and lubrication schemes are used for C&U automotive alternator bearings, which perfectly meet the requirements of the working conditions. This type of product can be distinguished by a "SA" in front of the part numbers.

TM series automobile gearbox bearings

Deep groove ball bearings for automobile gearbox work in the oil mist environment formed by the lubricant. This lubricant can contain metal impurities such as iron filings caused by gear wear and can result in raceway surface initiated fatigue. Gearboxes rely mainly on spiral gear, helical gears and other types of gears to transmit torque, therefore bearings must be able to withstand large axial loads and shock loads. With the advancement of science and technology, customers have put forward higher requirements for their reliability, vibration and noise.

C&U deep groove ball bearings for automotive gearboxes adopt improved load designs based on working conditions, and utilize special raw materials, heat treatment, sealing structure, etc. This type of product can be distinguished by a "TM" in front of the part number.

Rocker arm bearings

Rocker arm bearings are primarily used in the cam mechanism of the cylinder head of automobile / motorcycle engines, and assume the normal opening and closing functions of the valves. They play an important role in the intake and exhaust of fuel and combustion gases in the engine. When the engine is running, the cam will continue to rotate. In the past, when slider rocker arm was used, the force is transmitted from the cam to the rocker arm, which is called "sliding contact". Now "rolling contact" with less friction is realized by using a full complement needle roller arm or roller rocker arm.

The bearing structure is divided into two categories: one is needle roller bearings, which are composed of outer roller, rolling element (needle), and shaft pin; the other is roller sliding bearings, which are composed of outer roller, roller bushing, and shaft pin or composed of the outer roller and the shaft pin. Due to the limited space of the engine cylinder head, the bearing specifications and sizes are basically similar. The inscribed circle of needle roller bearings is generally within 7-16 mm, and the outer diameter is generally between 17-30 mm. The size of sliding bearing is slightly larger than needle roller type, with outer diameter ranging from 35 to 45mm.

Shock absorber bearings

The shock absorber bearing is mainly used to keep the shock absorber rotating synchronously with the wheels so as to ensure flexibility when steering the vehicle. In the course of driving, various road conditions will appear. In order to improve the driving comfort, the shock absorber bearings need to have a high load carrying capacity, strong impact resistance, good sealing performance, low starting torque, long life characteristics to ensure that the bearings will not crack, wear, and make abnormal noise during driving.

Commonly used shock absorber bearings are divided into three structural forms: all-metal, all-plastic, and a combination of metal and plastic. The shock absorber bearing can maintain the soft connection between the vehicle body and the shock absorber. This prevents the vibration from being transmitted to the body through the shock absorber when the car is running.

Automotive steering needle roller bearings

The needle roller bearing is installed in the steering column of the automobile steering system, and supports the steering movement. The outer ring of the bearing (sheet metal) can eliminate radial steering clearance by pre-tight fitting the steering column with the outer rubber. At the same time, the inherent elasticity of the rubber material is skillfully used to reduce the bumps and vibrations generated during driving.

The steering gear bearing is composed of rubber cover, metal raceway ring, cage and needle roller.

Automotive air-conditioning compressor electromagnetic clutch bearings

Automobile air-conditioning compressor electromagnetic clutch bearings are special products, which are designed under installation dimensions and working conditions provided by customers. Its structure is similar to the that of double-row radial thrust ball bearings, but the double-row ball bearings of air-conditioning electromagnetic clutches have the following advantages:

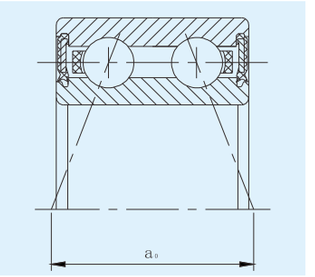
- High temperature resistance, high speed and high reliability

Double-row ball bearing of the air-conditioning electromagnetic clutch operates under high temperature as it is near the engine. Special heat treatment and high-performance grease are used to meet the required high temperature performance.

- Good sealing performance

Since this kind of bearing operates under harsh environment such as long-term work in dust and water vapor, unique sealing structure will be adopted to fully meet the working requirements.

This type of product has high precision and low noise performance, and the products can be produced in large quantities for all size ranges.



The 1st generation hub bearings

The 1st generation hub bearings are a special product designed based on the installation dimensions and working conditions provided by customers. Its characteristics are as follows:

- The hub bearings are all made of high-quality steel and excellent performance grease. They are featured by high load ratings, impact resistance, good mud as well as water resistance, compact structure and light weight.
- Withstand large axial and radial loads simultaneously
- Long-term operation with no need to add lubricant after installation.

Basic knowledge of wheel hub bearings

1. Product performance characteristic and development history

The wheel bearing is the component used in automobile axle for load-bearing and providing accurate guidance for the rotation of the wheel hub. It bears both axial load and radial load, and plays an important role in load-bearing and wheel rotation.

The first-generation hub bearings consist of double-row angular contact ball bearings or double-row tapered roller bearings, and the second-generation hub bearings consist of double-row angular contact ball bearings or double-row tapered roller bearings with flanges on the outer ring or inner ring. The third-generation hub bearing is composed of double-row angular contact ball bearings or double-row tapered roller bearings with flanges on the inner or outer rings, and the fourth-generation hub bearing is composed of the third-generation hub bearing and half shaft.

2. Relevant parameters

2.1 Coding method

The code of automotive wheel hub bearing unit is composed of type code, the dimension indicating the bearing unit's matching installation features, and the suffix code. Please refer to Table 1 for the arrangement.

Table 1

Basic code of bearing unit		Suffix code
Type code	Dimension indicating the bearing unit's matching installation features	Suffix code

2.2 Type code

Type code is represented by letters. Please refer to Table 2.

Table 2

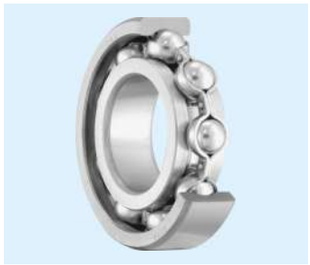
Type	Code meaning
DAC	First generation double row angular contact ball bearing unit
DU	First generation double row tapered roller bearing unit
DACF	Second-generation double row angular contact ball bearing unit with flanged outer ring or inner ring
DUF	Second-generation tapered roller bearing unit with flanged outer ring or inner ring
DAC2F	Third-generation double row angular contact ball bearing unit with flanged inner and outer rings
DU2F	Third-generation double row tapered roller bearing unit with flanged inner and outer rings

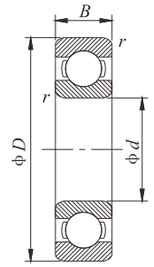
2.3 Dimension code

The dimension code is represented by 7-digits numerals (C&U is represented by 6-digits numerals). The first two digits represent the number of bearing inner diameter d; the middle three digits (C&U is denoted by two digits) represent the number of bearing outer diameter D (flanged outer diameter F for outer ring with flange); the last two digits represent the maximum width number(in mm) of the bearing (B for the width of inner ring and C for the width of outer ring. The width of two inner rings is not the same as the width of an outer ring in some cases).

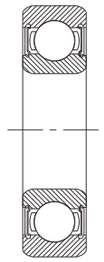
2.4 Suffix code

The suffix code is a supplementary code added after the basic code of the bearing unit when the structure, size, tolerance and technical requirements are changed. The sequence and meaning of the suffix code are defined in GB/T272 and JB/T2974.

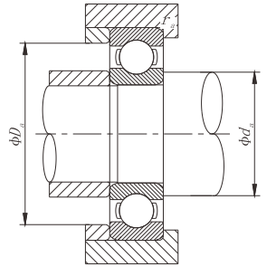




Open type

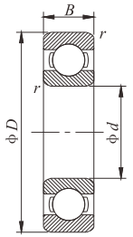


Contact seal type RS



d 8~40 mm

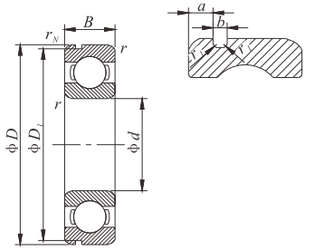
Boundary dimensions (mm) d	D	B	r (Min)	Basic load ratings (kN) C_r	C_{0r}	Limiting speeds (r/min) Contact type (grease)	Nominal numbers		Mounting dimensions (mm) d_a Min	D_a Max	r_a Max	Reference mass (kg) Open type
8	23	14	0.3	3.90	1.53	32,000	SAEC608X3-2RS		10	21	0.3	0.0242
10	26	10	0.3	5.10	2.39	21,000	SA6200-2RS		12	24	0.3	0.0327
12	28	8	0.3	5.10	2.37	18,000	SA6001-2RS		14	26	0.3	0.022
	32	10	0.6	6.82	3.06	16,000	SA6201-2RS		16	28	0.6	0.0368
15	32	9	0.3	5.60	2.84	18,000	SA6002-2RS		17	30	0.3	0.0318
	35	11	0.6	7.65	3.75	15,000	SA6202-2RS		19	31	0.6	0.04335
	35	13	0.6	7.65	3.75	15,000	SA6202/13-2RS		19	31	0.6	0.051
	42	13	1.0	11.40	5.43	12,000	SA6302-2RS		20	37	1	0.0786
17	40	12	0.6	9.55	4.80	12,000	SA6203-2RS		21	36	0.6	0.0607
	47	14	1.0	13.50	6.49	11,000	SA6303-2RS		22	42	1	0.2209
	47	24	1.2	15.90	13.00	11,000	SA4303X2-2RS		23.5	41.5	1.2	0.1936
	52	16	1.0	15.90	7.85	19,000	SA175216-2RS		22	47	1	0.165
20	47	14	1.0	12.80	6.60	10,000	SA6204-2RS		25	42	1	0.103
	52	15	1.1	15.90	7.85	10,000	SA6304-2RS		26.5	45.5	1	0.144
22	56	16	1.1	18.50	9.40	9,200	SA63/22-2RS		28.5	49.5	1	0.169
25	52	15	1.0	14.00	7.90	8,900	SA6205-2RS		30	47	1	0.1302
40	90	23	1.5	40.70	24.00	5,300	SA6308-2RS		48	82	1.5	0.633



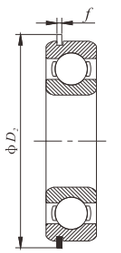
Open type

Shielded type ZZ

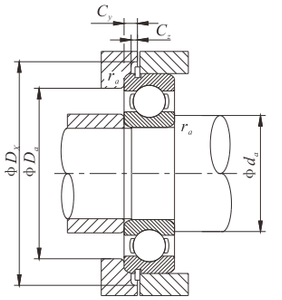
Contact seal type RS



With snap ring groove

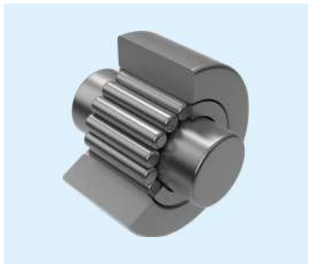


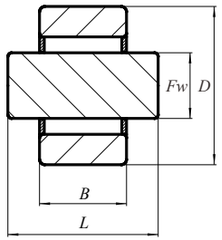
With snap ring



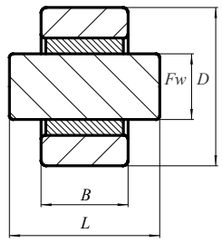
d 20~65mm

Boundary dimensions (mm) d	D	B	r (Min)	Basic load ratings (kN) C_r	C_{0r}	Nominal numbers	Dimension of snap ring (mm) D_2 Max	f Max	Limiting speeds (r/min) Grease	Oil	The dimension of snap ring and groove (mm) a Max	b Min	D_1 Max	r_1 Max	r_N Min	Mounting dimensions (mm) d_a Min	D_a Max	r_a Max	D_X Min	C_y Min	C_z Min	Reference mass (kg)
20	47	14	1	12.80	6.60	**TM6204**	52.7	1.12	15,000	18,000	2.46	1.35	44.6	0.4	0.5	25	42	1	53.5	3.3	1.2	0.101
	52	15	1	15.90	7.85	**TM6304**	57.9	1.12	14,000	17,000	2.46	1.35	49.73	0.4	0.5	26.5	28.5	1	58.5	3.3	1.2	0.146
	62	16	1	19.50	11.30	**TM6206/20**	—	—	11,000	13,000	—	—	—	—	—	25	57	—	—	—	—	0.247
23	56	15	1	18.50	9.30	**TM66/23**	61.7	1.12	13,000	15,000	2.46	1.35	53.6	0.4	0.5	28.5	49.5	1	62.5	3.3	1.2	0.151
25	62	17	1.1	20.60	11.20	**TM6305**	67.7	1.7	11,000	13,000	3.28	1.9	59.61	0.6	0.5	31.5	55.5	1	68.5	4.6	1.7	0.225
25.5	58	16	1.1	19.50	11.20	**TM66/25.5**	63.7	1.12	13,000	15,000	2.46	1.35	55.6	0.4	0.5	33	53	1	64.5	3.3	1.2	0.203
28	58	16	1	16.60	9.50	**TM62/28-2RSN**	63.7	1.12	12,000	14,000	2.46	1.35	55.6	0.4	0.5	33	53	1	64.5	3.3	1.2	0.175
	68	18	1.1	26.70	14.00	**TM63/28-2RS**	74.6	1.7	10,000	13,000	3.28	1.9	64.82	0.6	0.5	34.5	38.5	1	76	4.6	1.7	0.292
	70	20	1.1	29.90	17.00	**TM63/28X3-2RS**	77	1.7	9,500	11,000	3.28	1.9	66.85	0.6	0.5	34.5	63.5	1	80	4.6	1.7	0.355
30	62	16	1	19.50	11.30	**TM6206N**	67.7	1.7	11,000	13,000	3.28	1.9	59.61	0.6	0.5	35	57	1	68.5	4.6	1.7	0.198
	62	17	1	29.90	17.30	**TM6206X2-2RS**	67.7	1.7	10,750	12,700	3.28	1.9	59.61	0.6	0.5	35	57	1	68.5	4.6	1.7	0.191
	72	19	1.1	26.70	15.00	**TM6306**	78.6	1.7	9,500	12,000	3.28	1.9	68.81	0.6	0.5	36.5	65.5	1	80	4.6	1.7	0.225
	75	21	1.1	33.00	17.00	**30TM04-2RSN**	81.6	1.7	9,200	11,000	3.28	1.9	71.83	0.6	0.5	38.5	68.5	1	83	4.6	1.7	0.370
32	75	20	1.1	29.90	17.00	**TM63/32N**	81.6	1.7	9,000	11,000	3.28	1.9	71.83	0.6	0.5	38.5	68.5	1	83	4.6	1.7	0.382
	80	23	1.5	39.70	21.50	**32TM03-2RSN**	84	1.7	8,700	10,000	4.75	2	77.6	0.6	0.5	40	72	1	88	4.6	1.7	0.420
35	62	14	1	15.90	10.30	**TM6007**	67.7	1.7	11,000	13,000	2.08	1.9	59.61	0.6	0.5	40	57	1	68.5	3.4	1.7	0.236
	72	17	1.1	25.70	15.30	**TM6207**	78.6	1.7	9,200	11,000	3.28	1.9	68.81	0.6	0.5	43	72	1.5	88	4.6	1.7	0.284
	80	21	1.5	33.50	19.20	**TM6307N**	86.6	1.7	8,500	10,000	3.28	1.9	76.81	0.6	0.5	43	72	1.5	88	4.6	1.7	0.460
	85	23	1.5	36.90	21.10	**TM6307X3-2RSN**	91.6	1.7	8,000	9,500	3.28	1.9	81.81	0.6	0.5	43	78	1.5	93	4.6	1.7	0.501
40	68	15	1	16.80	11.50	**TM6008-2RSN**	74.6	1.7	10,000	12,000	2.49	1.9	64.82	0.6	0.5	45	63	1	76	3.8	1.7	0.183
	80	18	1.1	29.10	17.90	**TM6208**	86.6	1.7	8,500	10,000	3.28	1.9	76.81	0.6	0.5	46.5	73.5	1	88	4.6	1.7	0.365
	90	23	1.5	40.50	24.00	**TM6308**	96.5	2.46	7,500	9,000	3.28	2.7	86.79	0.6	0.5	48	82	1.5	98	5.4	2.5	0.630
	92	25.5	1.5	36.90	21.10	**TM6308X3-2RSNR**	96.5	2.46	7,500	9,000	3.28	2.7	88.7	0.6	0.5	48	82	1.5	98	5.4	2.5	0.735
45	85	19	1.1	31.50	20.40	**TM6209N**	91.6	1.7	8,000	8,500	3.28	1.9	81.81	0.6	0.5	51.5	78.5	1	93	4.6	1.7	0.398
	100	25	1.5	53.00	32.00	**TM6309N**	106.5	2.46	6,700	8.000	3.28	2.7	96.8	0.6	0.5	53	92	1.5	108	5.4	2.5	0.822
55	100	21	1.5	43.50	29.30	**TM6211**	106.5	2.46	6,300	7,500	3.28	2.7	96.8	0.6	0.5	63	92	1.5	108	5.4	2.5	0.586
65	140	33	2.1	92.50	60.00	**TM6313N**	149.7	2.82	4,800	6,000	4.9	3.1	135.23	0.6	0.5	76	129	2	152	7.3	2.9	2.078





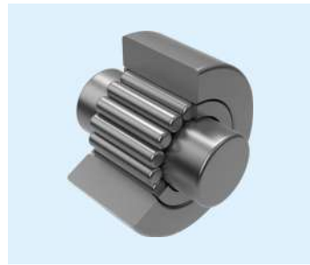
Rolling type

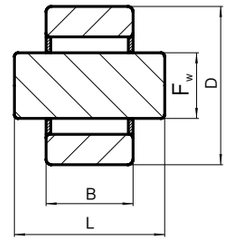


Sliding type

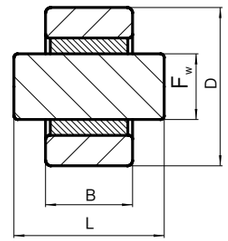
Rolling type

Boundary dimensions (mm)				Basic load ratings (kN)		Nominal numbers	Mass (g)
F_w	D	B	L	C_r	C_{0r}		
8.3	17	5.5	11	5.1	4.9	**NK8.3175.5X**	11.4
8.3	20	11	19	9	10.2	**NK8.32011**	29
8.4	20	11	18.9	9.6	10.4	**NK8.42011**	28.5
8.8	20	6	14.5	6.2	5.5	**NK8.82006**	20.2
8.8	20	8	17.5	8.3	8.1	**NK8.82008**	22.8
8.8	20	12	23.5	11.8	12.7	**NK8.82012**	31.6
8.8	20	12.1	19	10.6	11.2	**NK8.82012.1**	31.5
8.8	20	14	26.5	13.6	15.3	**NK8.82014**	37.1
8.8	22	10	22.1	9.5	9.6	**NK8.82210**	33.7
8.76	22	10	23.5	10.5	11	**NK8.762210**	35.9
9.56	21	5.1	13.4	5.2	6.1	**NK9.56215.7**	18.7
9.56	21	5.8	13.6	5.5	5.5	**NK9.56215.8**	19
5.135	21	5.4	12.3	4	3.3	**NK5.135215.4**	15.2
7.56	17.2	12.7	21.4	9.9	12.9	**NK7.5617.212.7**	23.6
7.56	17	10.5	17	10.4	10.3	**NK7.561710.5**	19.2
7.57	16	16	22.9	11.2	13.2	**NK7.571616**	25.2
7.57	17	9	16.4	9.5	10.7	**NK7.571709**	17.2
7.572	17.8	12.7	19.6	9.4	12.1	**NK7.57217.812.7**	25
7.572	17.8	12.7	21.6	9.4	12.1	**NK7.57217.812.7X**	25.3
7.573	17	10.5	18.2	9.1	10.1	**NK7.5731710.5**	20.2
7.6	17.8	12.7	19.5	9	13	**NK7.617.812.7**	25.3
7.645	17	10.5	18.2	6.2	7.8	**NK7.6451710.5**	20.2
7.645	18	10	16.45	8.5	9.2	**NK7.6451810**	21
7.65	16	16	22.1	12.7	15.5	**NK7.651616**	25.5
7.65	17.8	10.8	17	8.7	12.7	**NK7.6517.810.8**	20.8
7.65	18	8	13.3	6.9	7.1	**NK7.651808**	17.1
7.65	18	8	14	6.9	7.1	**NK7.651808X**	17.4
7.65	18	8	14.4	6.9	7.1	**NK7.651808X1**	17.9





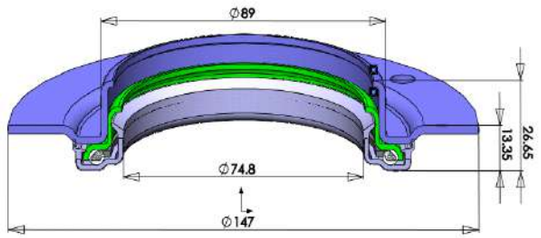
Rolling type



Sliding type

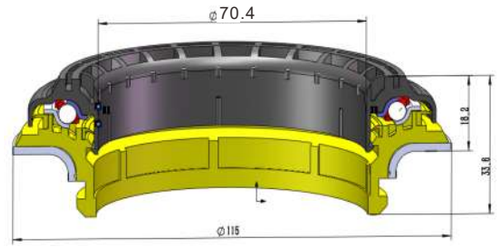
Rolling type

Boundary dimensions (mm)				Basic load ratings (kN)		Nominal numbers	Mass (g)
F_w	D	B	L	C_r	C_{0r}		
7.65	19	9	16.2	9.1	9.1	**NK7.651909**	21.2
7.65	18	10.5	17	9.2	10.3	**NK7.651810.5**	22.3
7.7	27	13.8	25	12.7	12.5	**NK7.72713.8**	62.6
8	18	18	24.4	14.2	18.7	**NK081818**	35.5
8	20	12.3	19	10.7	12.5	**NK082012.3**	30
8	20	12.5	19	11.9	12.9	**NK082012.5**	30.3
8.26	17	10.5	17.2	9.5	10.8	**NK8.261710.5**	19.9
8.3	17	10.5	16.5	9.1	11.6	**NK8.31710.5**	20
8.75	28	10	17.1	9.6	9.8	**NK8.752810**	49.6
8.983	22.86	12.7	19.4	15.7	14.6	**NK8.98322.8612.7**	40.2
8.3	17	5.5	11	5.1	4.9	**NK8.3175.5**	10.4
8.3	17	6.5	13	5.7	5.8	**NK8.3176.5**	12.2
8.8	20	6.5	15	6.2	5.6	**NK8.8206.5**	16.5
14.6	25	6	14.3	7.7	8.9	**NK14.6256**	25.3
14.64	25	6.1	14.3	7	9.9	**NK14.64256.1**	25.8
15.275	25	9.6	16.5	10.9	17.6	**NK15.275259.6**	35.9
15.3	25	9.7	16.5	12.5	17	**NK15.3259.7**	36.8
8.307	17	6.5	12.5	6.6	6.8	**NK8.307176.5**	11.7
Sliding type							
10	21	9.5	19			**NK10219.5IR**	31.3
9	18	12.65	21			**NK091812.65IR**	28.4
16	30	18	32.8			**NK163018IR**	118.5
5	12	7	14.4			**NK051207IR**	7.3
18	32	19.5	35			**NK183219.5IR**	150.5



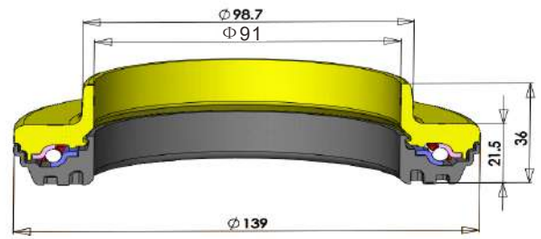
Angular contact

Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB75107ATN6	13.35	Φ147	Φ74.8	26.65	12.96	42.01	438.6



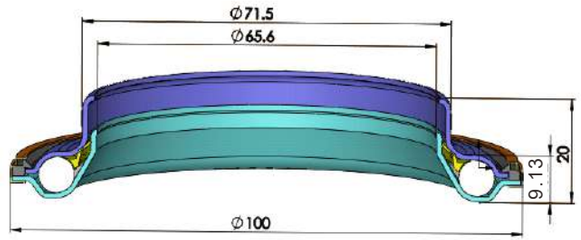
Angular contact

Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB70115ATN4	18.2	Φ115	Φ70.4	33.6	13.22	41.92	225.7



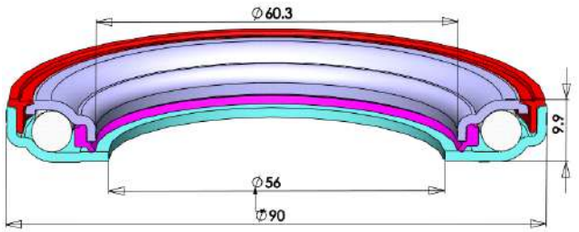
Angular contact

Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB91139ATN4	21.5	Φ139	Φ91	36	13.4	49.3	322

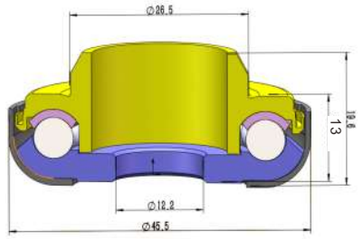


Angular contact

Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB67100A	9.13	Φ100	Φ65.6	20	19	44.3	135

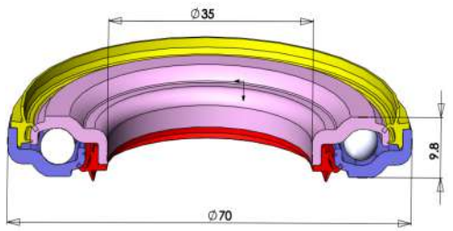


Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB5690A	9.9	Φ90	Φ56	9.9	27.46	77.61	161.2

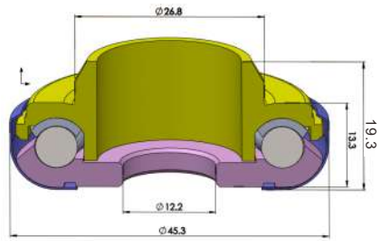


Thrust

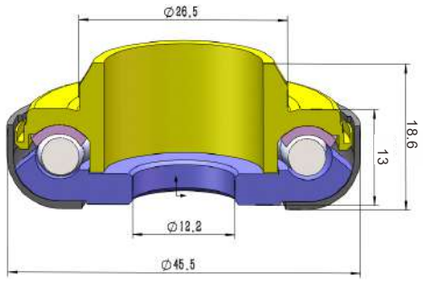
Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB1245T	13	Φ45.5	Φ12.2	19.6	18.2	26.4	63.1



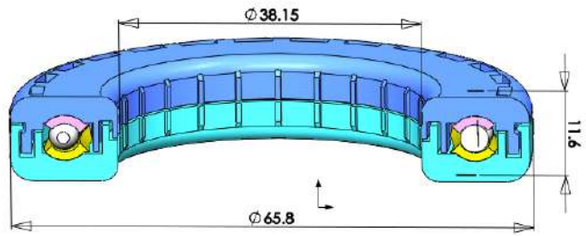
Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB3570A	9.8	Φ70	Φ35	9.8	20.03	47.2	127.21



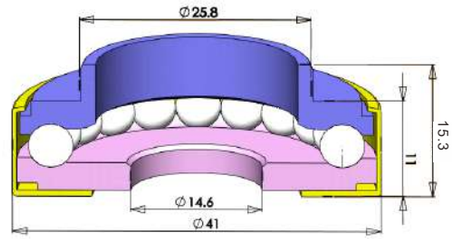
Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB1245TYA	13.3	Φ45.3	Φ12.2	19.3	18	34.9	64



Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB1245TYA1	13	Φ45.5	Φ12.2	18.6	18.2	26.4	63.1

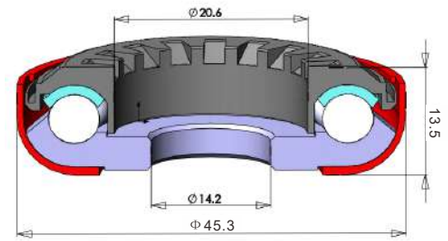


Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB3866T	11.6	Φ65.8	Φ38.15	11.6	12.46	39.79	50.64

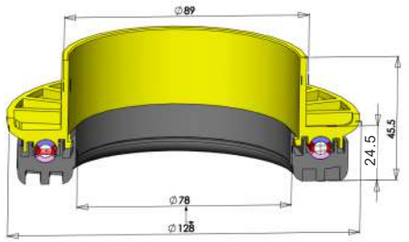


Thrust

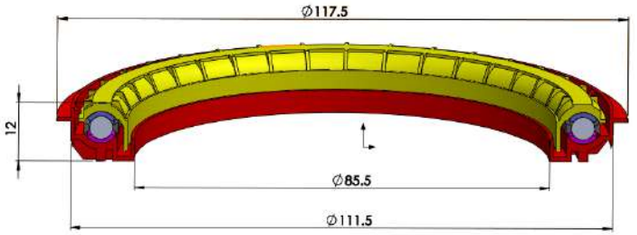
Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB1541T	11	Φ41	Φ14.6	15.3	14.48	30.8	67.56



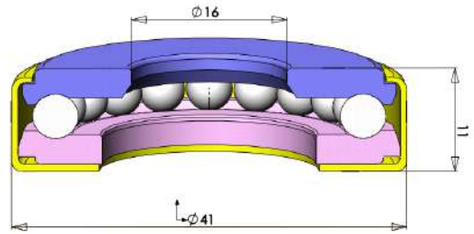
Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB1445T	13.5	Φ45.3	Φ14.2	13.5	18.2	26.4	60



Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB78128	24.5	Φ128	Φ78	45.5	16.2	64.3	222.36

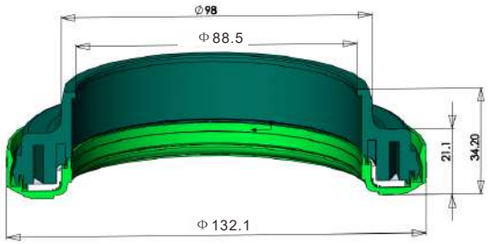


Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB86118	12	Φ117.5	Φ85.5	12	16.7	67.1	80



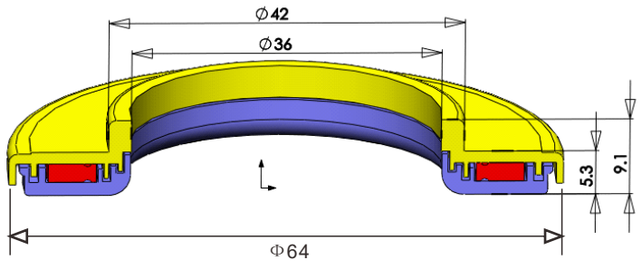
Pure thrust

Nominal numbers	Boundary dimension (mm)				Basic load ratings (kN)		Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	C_a	C_{0a}	
SSB1641	11	Φ41	Φ16	11	14.48	30.08	61.24

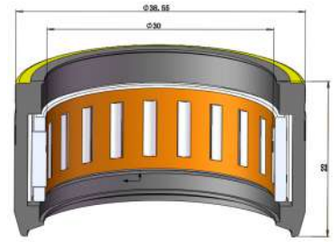


Pure plastic

Nominal numbers	Boundary dimension (mm)				Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	
SSB91132S	21.1	Φ132.1	Φ88.5	34.2	185.14

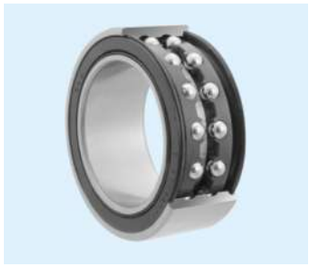


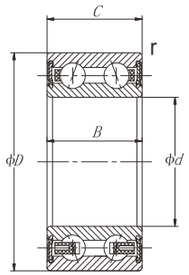
Nominal numbers	Boundary dimension (mm)				Mass (g)
	Assembly height	Outer diameter	Inner diameter	Total height	
SSB3664	5.3	Φ64	Φ36	9.1	11.5



Steering bearing

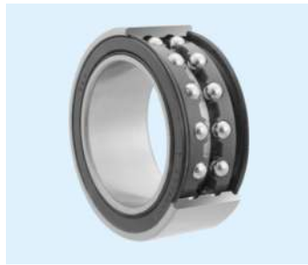
Nominal numbers	Boundary dimension (mm)			Basic load ratings (kN)		Mass (g)
	Inner diameter	Outer diameter	Total height	C_a	C_{0a}	
HK3038.5522YTN1	30	38.55	22	8.1	13.3	33.55

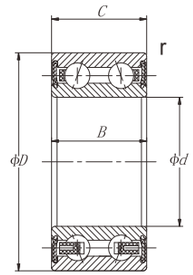




d 8~40 mm

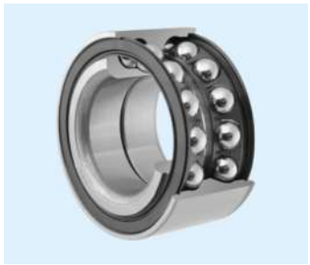
Boundary dimensions (mm)					Basic load ratings (kN)		Nominal numbers	Reference mass (kg)
d	D	B	C	r_{Min}	C_r	C_{0r}		
8	22	14	14	-	3.91	1.88	**STDA082214-2RZ**	0.024
17	35	14	14	-	7.5	6	**DA173514-2RS**	0.057
25	47	16	16	-	8	8.5	**DA254716-2RS**	0.116
30	47	18	18	0.6	8.05	8.95	**DA304718-2RS**	0.100
	47	20	20	0.7	13.2	11.2	**DA304720-2RS**	0.110
	47	22	22	0.6	13.18	10.46	**DA304722-2RS**	0.121
	52	20	20	0.7	15.98	13.12	**DA305220-2RS**	0.136
	52	22	22	0.8	16	13.1	**DA305222-2RS**	0.146
	55	19	19	0.7	16.8	14.4	**DA305519-2RS**	-
	55	23	23	0.8	17.9	14.7	**DA305523-2RS**	0.196
	62	27	27	1.0	25.2	18.4	**DA306227-2RS**	0.331
32	47	18	18	0.4	10.75	9.84	**DA324718-2RS**	0.083
	55	23	23	1	19.89	16.33	**DA325523-2RS**	0.168
35	48	20	20	0.2	8.71	8.95	**DA354820-2RS**	-
	50	20	20	0.4	11.1	10.7	**DA355020-2RS**	0.095
	52	15	15	0.5	11.5	11.4	**DA355215-2RS**	-
	52	20	20	0.5	14.3	13.3	**DA355220-2RS**	0.118
	52	22	22	0.5	14.3	13.3	**DA355222-2RS**	0.129
	55	20	20	0.6	15.5	14.1	**DA355520-2RS**	-
	62	24	24	1.0	24	19.1	**DA356224-2RS**	0.251
	62	28	28	1.2	24.1	19.1	**DA356228-2RS**	0.292
	64	37	37	-	23.98	19.21	**DA356437-2RS**	0.424
38	54	17	17	0.5	9.21	10.92	**DA385417-2RS**	0.094
39	90	37	37	0.8	46.8	42.7	**DA399037-2RS**	-
40	55	24	24	0.5	10.34	9.49	**DA405524-2RS**	0.130
	57	24	20	0.6	12.15	12.38	**DA405720/24-2RS**	0.132
	57	24	24	0.4	14.7	14.5	**DA405724-2RS**	0.142
	62	20.625	20.625	1.0	18	17.5	**DA406220.625-2RS**	0.175

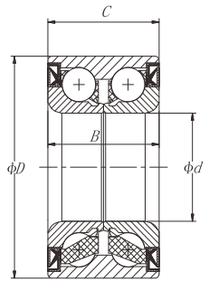




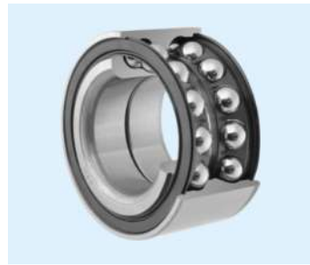
d 40~50 mm

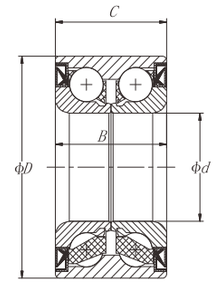
Boundary dimensions (mm)					Basic load ratings (kN)		Nominal numbers	Reference mass (kg)
d	D	B	C	r_{Min}	C_r	C_{or}		
40	62	24	20.625	1.0	18	17.5	**DA406220.625/24-2RS**	0.175
	62	24	24	0.9	18.4	17.7	**DA406224-2RS**	0.217
	66	24	24	1	14.53	14.94	**DA406624-2RS**	0.254
	68	30	30	0.6	25.1	22.62	**DA406830-2RS**	0.263
45	75	32	32	1.4	39.5	29.2	**DA457532-2RS**	0.453
50	80	32	32	0.9	34.9	30.7	**DA508032-2RS**	0.485
	90	30.2	30.2	1.6	43.85	39.94	**DA509030.2-2RS**	0.692
	90	40	40	1.6	43.85	39.94	**DA509040-2RS**	0.905



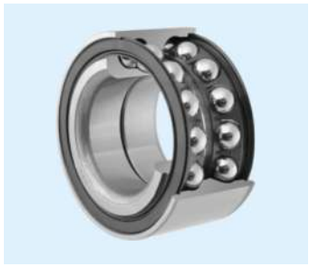


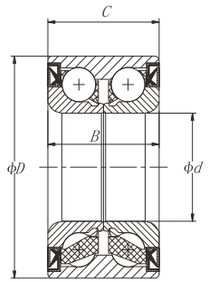
Boundary dimensions (mm)				Bearing numbers
d	D	B	C	
25	52	37	37	**DAC255237**
25	52	42	42	**DAC255242**
25	62	25.4	25.4	**DAC2562254**
28	58	42	42	**DAC285842**
30	55	32	32	**DAC305532**
30	60	37	37	**DAC306037**
30	60.03	37	37	**DAC30600337**
30	62	38	38	**DAC306238**
30	64	42	42	**DAC306442**
34	62	37	37	**DAC346237**
34	64	37	37	**DAC346437**
34	66	37	37	**DAC346637**
35	61.8	40	40	**DAC356240A**
35	62	40	40	**DAC356240B**
35	64	37	37	**DAC356437**
35	65	35	35	**DAC356535**
35	66	37	37	**DAC356637**
35	68	37	37	**DAC356837**
35	68	42	42	**DAC356842**
35	72.04	34	34	**DAC35720434**
35	72	33	33	**DAC357233**
35	72	34	34	**DAC357234**
35	72	35	20	**DAC357235/20**
36	68	33	33	**DAC366833A**
37	68	34	34	**DAC376834**
37	72	33	33	**DAC377233**
37	72	37	37	**DAC377237**
37	72.04	37	37	**DAC37720437**
38.1	70	37	37	**DAC387037**
38	70	38	38	**DAC387038**
38	71	39	39	**DAC387139**
37.99	72.02	36	33	**DAC38720236/33**
38	73	40	40	**DAC387340**



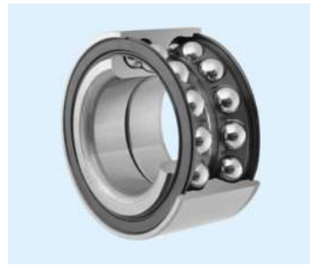


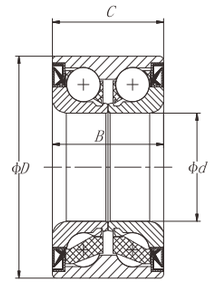
Boundary dimensions (mm)				Bearing numbers
d	D	B	C	
38	74.02	36	33	**DAC38740236/33**
39	68.07	37	37	**DAC39680737**
39	72.03	37	37	**DAC39720337**
39	72.03	37	37	**DAC39720337A**
39	74	39	39	**DAC397439**
40	72.03	37	37	**DAC40720337**
40	74	36	36	**DAC407436**
40	74	40	40	**DAC407440**
40	74	42	42	**DAC407442**
40	75	37	37	**DAC407537**
40	75	39	39	**DAC407539**
39/41	75	37	37	**DAC39/417537**
40	80	36	34	**DAC408036/34**
42	72	38	35	**DAC427238/35**
42	72	38	38	**DAC427238**
42	75	37	37	**DAC427537**
42	76	38	35	**DAC427638/35**
42	76	40	37	**DAC427640/37**
42	80	36	34	**DAC428034/36**
42	80	37	37	**DAC428037**
42	80	45	45	**DAC428045**
42	80.03	42	42	**DAC42800342**
42	82	36	36	**DAC428236**
42	82	37	37	**DAC428237**
42	84	39	39	**DAC428439**
43	82	45	45	**DAC438245**
43/45	82	37	37	**DAC43/458237**
45	83	45	45	**DAC458345**
45	84	39	39	**DAC458439**
45	84	41	39	**DAC458439/41**
45	84	42	40	**DAC458442/40**
48	86	40	40	**DAC488640**



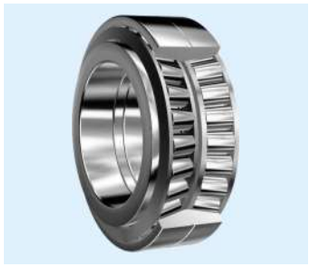


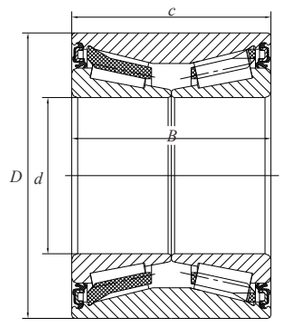
Boundary dimensions (mm)				Bearing numbers	
d	D	B	C		
50	90	34	34	**DAC509034**	
25	52	20.6	20.6	**DAC2552206**	
25	52	43		**DAC255243**	
25	55	43		**DAC255543**	
25	56	32		**DAC255632**	
25	72	43		**DAC257243**	
27	60	50		**DAC276050**	
30	65	21		**DAC306521**	
30	68	45		**DAC306845**	
30	72	30.2		**DAC3072302**	
32	70	38		**DAC327038**	
32	72	45		**DAC327245**	
34	64	34		**DAC346434**	
35	66	32		**DAC356632**	
35	66	33		**DAC356633**	
34.99	68.02	33	30	**DAC35680233/30**	
35	72.02	28		**DAC35720228**	
35	72.04	33		**DAC35720433**	
35	72.02	33	31	**DAC35720233/31**	
36	72.05	34		**DAC36720534**	
37	72.02	37		**DAC37720237**	
37	74	45		**DAC377445**	
38	71.02	33	30	**DAC38710233/30**	
38	72	34		**DAC387234**	
38	72	40		**DAC387240**	
38	72	36	33	**DAC387236/33**	
38	74	50		**DAC387450**	
39	68.06	37		**DAC39680637**	
39	72.06	37		**DAC39720637**	
40	72	36	33	**DAC407236/33**	
40	74	36	34	**DAC407436/34**	
40	76	33		**DAC407633**	



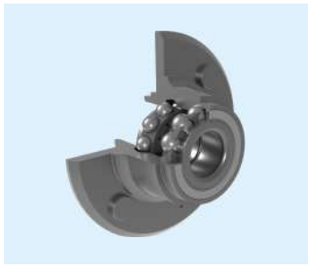


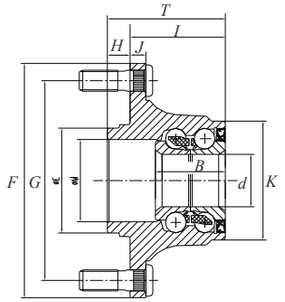
Boundary dimensions (mm)				Bearing numbers	
d	D	B	C		
40	76	33	28	**DAC407633/28**	
40	76	41	38	**DAC407641/38**	
40	80	30.2		**DAC4080302**	
40	80	31		**DAC408031**	
40	82	40		**DAC408240**	
40	84.03	38		**DAC408402538**	
42	76	39		**DAC427639**	
42	80	42		**DAC428042**	
42	84	36		**DAC428436**	
43	79	41	38	**DAC437941/38**	
43	80	38		**D AC438038**	
43	80	50	45	**DAC438050/45**	
43/45	85	37		**DAC43/458537**	
44	82.5	37		**DAC44825037**	
45	80	45		**DAC458045**	
45	85	23		**DAC458523**	
45	85	30.2		**DAC4585302**	
45	85	41		**DAC458541**	
49	84	48		**DAC498448**	
49	88	46		**DAC498846**	
49	90	46		**DAC499046**	
40	108	17	32	**DAC4010817/32**	



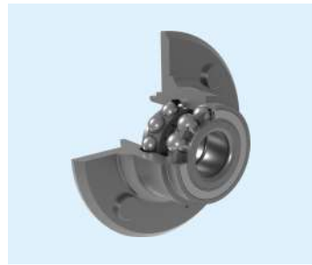


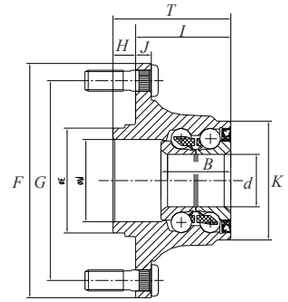
Boundary dimensions (mm)				Bearing numbers
d	D	B	C	
25	52	37	37	**DU255237**
25	52	43	43	**DU255243**
25	52	45	45	**DU255245**
25	53	37	37	**DU295337**
30	55	56	56	**DU305556**
30	69	46	38	**DU306946/38**
34.93	65.09	55.37	55.37	**3896996A**
40	80	45	44	**DU408044X2**
42	76	39	39	**DU427639**
47	88	57	57.5	**DU478857/57.5**
49	84	48	48	**DU498448**
54	96	51	51	**DU549651**





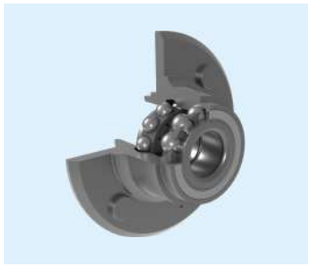
Boundary dimensions (mm)									Bearing numbers
d	F	B	T	G	K	H	I	J	
25	139	37	80	114	58	16	49.3	8	**DACF251393780**
25	133	43	73.4	108	71	19.4	54	12.3	**DACF251334373**
25	133	43	73.4	100	78	19.4	54	12	**DACF251334373A**
25	133	43	77.5	108	67	19.5	54	13	**DACF251334378**
26	131	66	37	108	78	21	66	10	**DACF261316637**
27	134	40	60	100	64.3	15	45	10.5	**DACF271344060**
27	134	50	67.5	100	64	15	52.5	9	**DACF271345068A**
27	134	50	67.5	100	64	15	52.5	11	**DACF271345068**
27	148	50	68	114	64	15.5	52.5	11.5	**DACF271485068**
27	148	55	73	114	64	15.5	57.5	11.5	**DACF271485573**
27	148	55	73	114	64	15.5	57.5	11.5	**DACF271485573A**
28	120	39	63.5	100	67.9	20	40	10.5	**DACF028G**
28	120	39	63.5	100	69.5	20	41.5	10.5	**DACF281203964**
28	120	40	55.5	100	63	6	49.5	9	**DACF281204055**
28	120	40	55.5	100	63	6	49.5	9	**DACF281204055A**
28	126	48	70.5	100	65	14	65.5	10	**DACF281264871**
28	127	82.5	37	100	72	19	59	10	**803640BB**
28	-	42	52	97	66.2	-	52	7.5	**DACF280004252**
28	130	44	57	100	67	14	51.5	10	**DACF281304457**
28	134	40	61	100	66	11.5	49.5	9	**DACF281344061**
28	134	40	67.5	114	63	18	49.5	9	**DACF281344068**
28	134	45	65.5	100	62.4	11.6	54	11.6	**DACF281344566**
28	135	47	70.7	100	68.5	11.7	59	8	**DACF281354771**
28	135	40	62.8	100	68.5	10.3	49.5	9	**DACF281354063**
28	139	38	64.5	114	70	14	50.5	9	**DACF281393865**
28	140	38	64.5	100	70	14	50	10	**DACF281403865**
28	140	48	70.5	114	63	14	50.5	9	**DACF281404871**
28	141	50.5	71	100	66.6	14	57	10.5	**DACF281415171**
30	-	42	-	99	68.2	-	51.8	7.5	**DACF300004200**
30	-	42	-	99	72	-	58.8	7.5	**DACF300004200**
30	-	42	-	99	73.6	-	51.8	7.5	**DACF300004200A**
30	-	42	52	99	72	-	52	7.5	**DACF300004252**
30	108	50	54	90	68	10	44	10	**DACF301085054**
30	117	37	56.2	98	62.5	6	43.2	10	**DACF301173756**
30	117	37	61.3	98	71.8	17	44.3	11	**DACF301173761**
30	117	37	61.6	98	66.5	17	44.6	11	**DACF301173762**

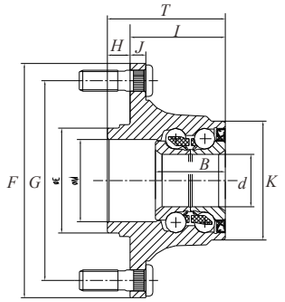




Boundary dimensions (mm)									Bearing numbers
d	F	B	T	G	K	H	I	J	
30	120	37	61.5	100	69.5	19	41	10.5	**800179**
30	120	37	61.5	100	69.5	19	41	10.5	**800179B**
30	120	37	63.5	100	69.5	19	44.5	10.5	**DACF301203764**
30	120	47	69	100	65	13.3	56	5	**DACF301224769**
30	122	46	70	100	67	14	56	10	**DACF301224670**
30	122	47	59.5	100	68	13.5	56	8	**DACF301224760**
30	125	50	70.5	100	68.9	14	56.5	10	**DACF301255071**
30	126	59	79	100	65.5	14.5	62.5	10	**DACF301265979**
30	130	43	65	108	77	12.5	52.5	13	**DACF301304365**
30	139	59	68	114	69.6	12.5	56	12.5	**DACF301395968**
30	131	43	71.3	108	76	19	51	13.5	**DACF301314371**
30	136	40	66	100	68.5	11.5	54.5	8	**DACF301364066**
30	136	41	66.5	100	68.5	11.5	55	8	**DACF301364166**
30	139	56	67.5	100	66	11.5	56.5	9	**DACF301395668**
30	140	50	70.5	114	68.9	14	56.5	9	**DACF301405071**
30	142	55	82	114	68	14	62	12.5	**DACF301425582**
30	148	48	64.5	100	72	15.5	49	12	**DACF301484865**
30	148	48	64.5	114	72.8	15.5	49	12	**DACF301484865A**
30	148	48	66.7	114	68	17.7	48.9	9.5	**DACF301484867**
30	148	48	66.7	114	68	17.7	48.9	9.5	**DACF301484837A**
30	151	59	68	105	69.5	12.2	55.9	10.5	**DACF301515968**
30	152	41	67.5	114	67	11.5	56	9.5	**DACF301524168**
30	152	50	56	114	67	14.5	56	9.3	**DACF301525056**
31	120	40	61	100	73.8	19	42	12	**DACF311204061**
32	139	45	65	114	74	14	64.5	9	**DACF321394565**
40	126	43	43	106	84	16.4	26.5	10	**DACF401264343**
49	126	50	50	110	92	12	38	10	**DACF491265050**

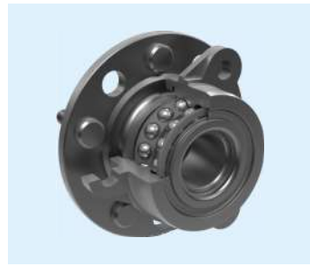
Gen 2 wheel hub bearing (tapered roller bearing)

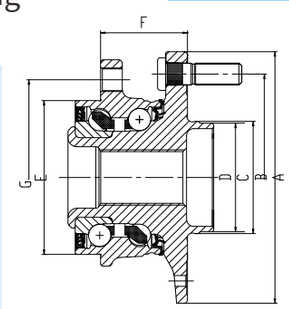




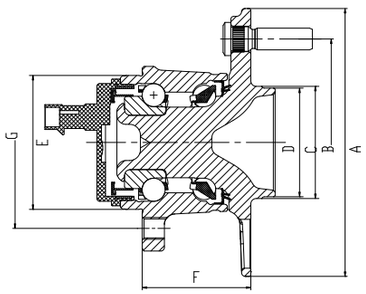
Boundary dimensions (mm)									Bearing numbers
d	F	B	T	G	K	H	I	J	
31	120	41	61	100	72	19	42	12.5	**DACF311204161A**
32	128	34	58.2	108	80	16	42.2	12.5	**DACF321283458**
32	129	38	59.3	108	76.2	17	42.3	12	**DACF321293859**
32	128	38	59	108	78	17	42	11	**DACF321283859**
33	140	47	71.2	114	77	14	54.7	9	**DACF331404771**
34	139	42	64.5	114	74	14	50.5	9	**DACF344394265**
34	140	42	70	114	75	15	55	9	**DACF341404270**
35	137	45	74	110	81	25	49	12	**DACF351374574**
35	137	45	69.5	108	81	20.5	49	12	**DACF351374570**
36	140	50	71	114	79	14	57	11	**DACF361405071**
37	139	45	64	120	84	19	45	11	**DACF371394564**
37	139	45	64	120	80	19	45	11	**DACF371394564A**
37	139	45	64	120	80	19	45	11	**DACF371394564B**
37	139	45	64	120	81.6	19	45	11	**DACF371394564C**
38	147	52	77	114	76.8	15	62	9	**DACF381475277**
43	˅	44	44	102	86	16.5	27.5	15	**DACF430004444**
45	124	41	41	106	88	3.8	37.2	10.5	**DACF451244141**

Gen 3 wheel hub bearing





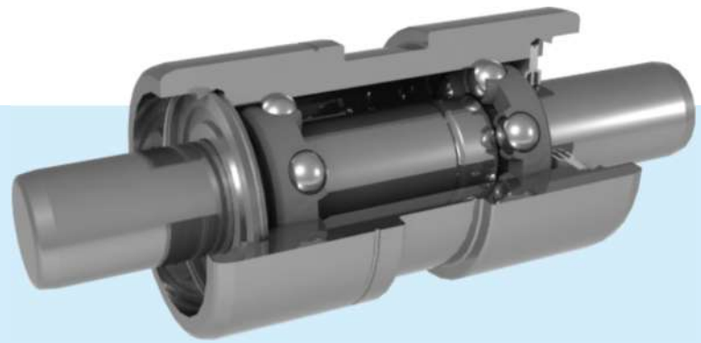
Gen 3 drive wheel bearing



Gen 3 non-drive wheel bearing

Boundary dimensions (mm)							Bearing numbers
A	B	C	D	E	F	G	
131	112	68	57	—	70	95	**DAC2F57R551**
148	114	76	67	66	59	100	**DAC2F66R7402**
150	115	70.1	70.7	71.8	65	101	**DAC2F72R4501A**
135	100	55	54	67	54.5	92	**DAC2F67R4403A**
135	100	55	54	67	54.5	92	**DAC2F67R4403B**
135	100	55	54	67	54.5	92	**DAC2F67R4403C**
135	100	55	54	67	54.5	92	**DAC2F67R4403D**
135	100	55	54	74	54	93	**DAC2F74R4404B**
145	114	55	54	74	54	93	**DAC2F74R4509**
136	109	67.9	64.3	83.5	43	103	**DAC2F84F6407**
135	100	55	54	74	60	95	**DAC2F74R4408**
139	114	60	56.5	90	37	114	**DAC2F90F5305A**
146	114	73.3	70	90	42	116	**04593450AA**
132	108	68	68	84	40.1	106	**DAC2F84F4512**
129	108	68	68	69	61	90	**DAC2F69R4511**
139	114	60	56.5	66	63	85.9	**DAC2F66R4413A**
140	114	62	60	72	105	60	**DAC2F72R4960A**
139	115	70.5	70	90	42	116	**DAC2F90F5314A**
139	114	69	67	84	58.5		**DAC2F84F4521D**
148	114.3	76	67	85	48		**DAC2F87R4522A**
140	108	62	54	70	58		**DAC2F71R4573A**
135	106	55	54	67	55.4		**DAC2F67R4484BAC**
142	110	69	67	84	58.5		**DAC2F84F4551D**
142	114.3	76	67	73	59		**DAC2F73R4550A**
129	108	71.05	65	76	57		**DAC2F80R4558BA**
134	108	65.5	60	65	59.2		**DAC2F65R4594A**
138	108	62	60	84	69		**DAC2F84R4559BA**

Water pump bearing



Water pump bearing

Water pump bearing

Water pump bearings are mainly used for various automotive cooling water pumps. Since engines as the cores of automobiles are developing toward larger power, higher reliability and lower consumption of energy, cooling water pumps are also required to have higher heat-resisting quality, larger loading capacity, excellent running accuracy as well as satisfactory sealing performance, etc. C&U water pump bearings are not only widely used for cooling water pumps for automobiles, similar products are also widely used in textile machinery, construction machine, etc.

1. Range of product

WB	Double row ball water pump bearing
WR	One row ball and one row roller water pump bearing
WB···C	Double row ball water pump bearing (internal angular contact design)
WR···C	One row ball and one row roller water pump bearing (internal four-point contact design)

Generally, WB and WR series water pump bearings can meet the functional requirements in most situations. Only when customer have higher requirements, WBC and WRC series with special internal design will be adopted.

2. Coding

Unit: mm

Basic code				Suffix code
Series	Shaft diameter	Housing diameter	Shaft length	1) Capital Latin letter represents different structures. 2) Numbers represent the sequence numbers of the same base dimension
WB	12	26	91	
WR	16	30	104	

3. Material and heat treatment

The steel balls and rollers of water pump bearings are generally made of high-carbon chromium bearing steel. The material of shaft and outer rings is carburizing or high-carbon chromium bearing steal. If the bearing is made of carburizing steel, the hardness of outer ring raceway is 60 - 64HRC while the shaft raceway shall not be lower than 60HRC and heat treatment quality shall be up to the specifications of ZB J36001. If the bearing is made of high-carbon chromium bearing steel, the hardness of outer ring raceway shall be 60 -64 HRC while the shaft raceway shall be 58-62HRC and the heat treatment quality shall be up to the specifications of JB/T1255. The hardness of steel balls and rollers shall be 61 -65 HRC.

4. Lubrication and seal

When assembling water pump bearings, the grease will not be replaced after filled. The grease quality affects the performance and bearing life directly. We commonly use high quality imported special lubricating grease, which has satisfactory resistance against water and applicable for large temperature range. If the working temperature is higher than 120°C, high temperature resistant lubricating grease shall be used. The grease fill amount shall be 30% - 50%. Since the water pump bearings working condition is moist, the invasion of water will affect the lubrication of bearing which prevent the oil film from forming fully, even rustiness will be generated. Fatigue flaking on the rolling surface will appear in advance and bearing life will reduce. C&U water pump bearings use seals with radial contact rubber design and seal structure has excellent resistance to water invading and grease leakage. Generally, we use NBR seals. FKM seals will be used if requirements are higher.

5. Clearance

Since water pump bearing is required to withstand deflective and lopsided load, shaft will tilt and vibrates. The excessive internal radial clearance after installation will directly affect the performance and bearing life. Theoretically, the maximum service life of the bearing can be achieved when clearance in the radial direction is slightly negative. Nevertheless, it is very difficult to achieve such an ideal status, whereas an excessive negative clearance will shorten the bearing life greatly. Therefore, it should be zero clearance or small positive clearance after installation. When the original radial clearance of the water pump bearing is determined, the clearance decrease caused by the interference fit between outer ring and housing and the clearance decrease lead by the component heat expansion due to temperature rise shall also be taken into consideration. The water pump housings are usually aluminum or iron. The fit between the water pump bearing and the housing often adopts interference fit. Recommended bore tolerances of pump housings are listed in Table 1. The radial clearances of a completed C&U water pump bearing is 15~35 μm if there is no special requirement (no load).

Table 1

Outside diameter D(mm)	Deviation of bore diameter of pump housing(μm)	
	Iron housing (iron)	Aluminum housing (aluminum)
~24	-27~-48	-46~-67
24~30	-33~-53	-56~-77
30~52	-34~-59	-71~-96

6. Accuracy

The dimension tolerances of water pump bearings shall conform to Table 2 and Table 3. The surface roughness of bearing fit surface and end face is shown in Table 4. The running accuracy, i.e. the radial runout of the shaft of complete bearings shall not be greater than 0.025 mm.

Table 2 Dimensional tolerance of water pump bearing (μm)

	D(mm)		$\triangle_{Dmp}$		V_{DP}	V_{DMP}	$\triangle_{Cs}$		V_{Cs}
Outer ring	From	Up to	Upper deviation	Lower deviation	Max	Max	Upper deviation	Lower deviation	max
	18	50	0	-13	16	10	0	-250	20

Table 3 Dimensional tolerance of water pump bearing (μm)

	D(mm)		$\triangle_{dmp}$		V_{dP}	V_{dMP}	$\triangle_{Bs}$	
Shaft	From	to	Upper deviation	Lower deviation	Max	Max	Upper deviation	Lower deviation
	0	30	0	-13	9	9	+250	-250

Table 4 Roughness of fit surface and end face of water pump bearings (μm)

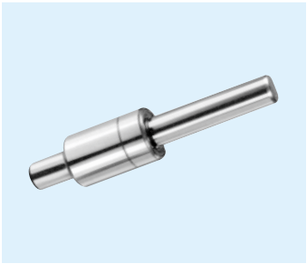
Position	Outer surface	End face	Chamfer
	R_a is not greater than		
Outer ring	0.63	1.25	5
Shaft	0.63	2.5	5

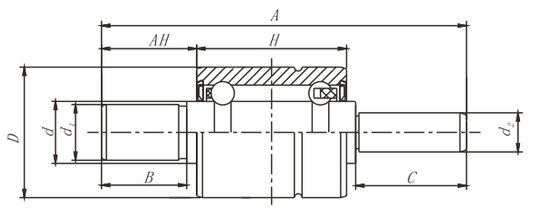
7. Assembly

The mounting of water pump bearings need to be done with care because the noise and vibration will increase once dust invaded into bearing raceway which will result into failure. Therefore please do not remove the dust proof and corrosion protection packaging before installation.

During installation, any eccentricity brought in by the mounted component or caused on fitting surface, unbalanced load will be generated. The eccentric component will generate swing during rotation, which will form rotating torque. All components with eccentricity and rotary load rotate with the shaft instead of being static in the direction of motion. If it is serious, the loading mode of the raceway will be changed, and become point loading on principal shaft raceway and 360° circumferential loading on outer ring raceway. While generally it should be point loading on the outer ring raceway and entire circumferential loading on the principal shaft raceway.

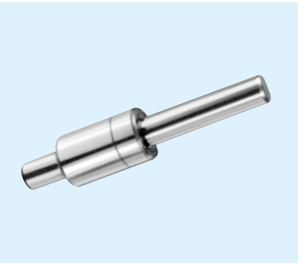
In such a situation, marginal stress of the roller and the misalignment of trace of single row ball will be formed, thereby lead to stress generation in the cage, intensified lubricating grease stirring, and temperature rise. Besides, the effect of equivalent load on each row of rolling elements will shorten the bearing's fatigue life. In addition, appropriate tools shall be used during installation to prevent damages, such as dents, fractures, etc. caused by intense impact borne by the bearing. When the bearing is mounted to the housing, attention shall be paid to prevent the installation force from applying to the rolling elements. In order to prevent this from happening, auxiliary tools contacting the surface of outer ring only must be used and mechanical pressed-in shall be employed. Please pay more attention to concentricity of the center of water pump shaft, impeller and mechanical seal and the spindle center when assembling. Mechanical pressure must be applied. Meanwhile, the other end face of the shaft must be supported to prevent the force transferring and applying to the balls. The interference fit between housing and outer ring of the bearing must be maintained in all applicable temperature range. Simultaneously sufficient supporting must be provided to prevent the deformation of the raceway. The bearing will fall off the housing if the interference fit is insufficient, while raceway deformation will generated if the interference fit is excessive.

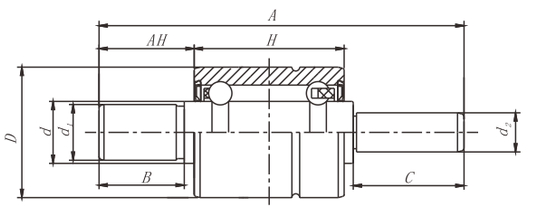




WB 1224, 1226, 1230 series

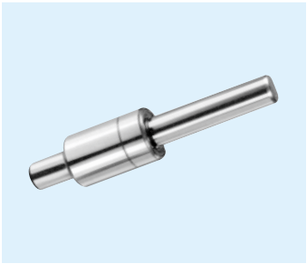
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
24	33.38	65.41	16	12.038	—	—	—	—	**WB1224065**
	33.38	78.83	17	12.038	—	—	—	—	**WB1224079**
	33.38	80	14.2	12.738	—	—	—	—	**WB1224080**
	33.38	83.57	16.39	12.738	—	—	—	—	**WB1224081-1**
	25	83	21	12	—	—	—	—	**WB1224083**
	33.38	82.73	16	12.038	—	—	—	—	**WB1224083-1**
	33.38	83.9	22.2	12.038	—	—	—	—	**WB1224084**
	27	85	21	12.038	—	—	—	—	**WB1224085**
26	39	86	12	12	—	—	—	—	**WB1226086**
	39	89.5	16.5	12	—	—	—	—	**WB1226090**
	39	90	14	12	—	—	—	—	**WB1226090-1**
	39	91	17	12	—	—	—	—	**WB1226091**
	39	93	16	12	—	—	—	—	**WB1226093**
	39	92.5	16.5	12	—	—	—	—	**WB1226093-1**
	39	94	21.5	12	—	—	—	—	**WB1226094Y**
	39	94.5	21.5	12	—	—	—	—	**WB1226095**
	39	97.5	17.5	12	—	—	—	—	**WB1226098**
	39	99	25	12	—	—	—	—	**WB1226099**
	39	102.5	21.5	12	—	—	—	—	**WB1226102**
	39	103.5	17.5	12	—	—	—	—	**WB1226103**
	39	103.5	21.5	12	—	—	—	—	**WB1226103-1**
	39	103.8	17.5	12	—	—	—	—	**WB1226104**
	39	104.4	—	12	—	—	—	—	**WB1226105**
	39	105.5	16.5	12	—	—	—	—	**WB1226106**
	39	113.5	17.5	12	—	—	—	—	**WB1226114**
	39	117	26	12	—	—	—	—	**WB1226117**
30	38.89	103.8	17.5	16	12	12	16	44.8	**WB1230104-1**
	38.89	105.65	16.25	15.918	12	12	14.5	48	**WB1230106D**

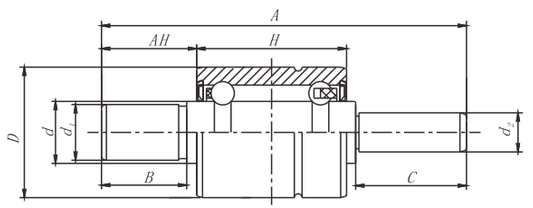




WB 1630 series

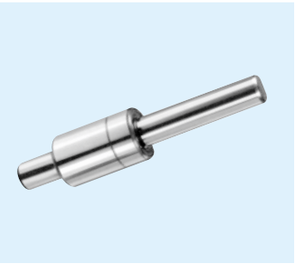
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	68.4	25	15.918	—	—	—	—	**WB1630068**
	38.89	68.66	27.8	15.918	—	—	—	—	**WB1630069**
	38.89	73	17	16	—	—	—	—	**WB1630073**
	38.89	73.91	11.4	15.918	—	—	—	—	**WB1630074**
	38.89	75.6	27.01	15.918	—	—	—	—	**WB1630076**
	23	77.8	15.5	15.918	—	12	—	37.3	**WB1730078**
	30	79.6	—	15.918	—	12	—	33	**WB1630080-1**
	27	80	15.9	15.918	—	—	—	—	**WB1630080-4**
	23	80.3	17.2	15.918	—	12	—	38.5	**WB1630080-3**
	30	80	18	16	12	12	17	31	**WB1630080D**
	38.89	80.95	22.48	15.918	—	—	—	—	**WB1630081**
	27	82.5	16.5	16	—	12	—	37	**WB1630083**
	30	83	18	16	—	12	—	33.8	**WB1630083D**
	25	83.1	16	15.918	—	—	—	—	**WB1630083C**
	30	84	17	15.918	—	12	—	33	**WB1630084**
	38.89	84.4	13	15.918	—	12	—	30	**WB1630084-1**
	27	84.4	17	15.918	—	—	—	—	**WB1630085-2**
	38.89	84.99	15.07	15.918	—	12.037	—	28	**WB1630085D**
	38.89	85.22	15.21	15.918	—	12.042	—	29.21	**WB1630085-1**
	30	86	16.5	15.918	—	12	—	37	**WB1630086**
	38.89	86	17	16	12	12	16	33	**WB1630086D**
	38.89	86.5	13.5	15.918	—	12.038	—	32.7	**WB1630087C**
	38.89	87.4	—	15.918	—	—	—	—	**WB1630087-1**
	38.89	86.5	—	15.918	—	12	—	32	**WB1630087-4**
	38.89	88	12.4	15.918	—	12	—	35.3	**WB1630088-1**
	30	87.5	13.5	15.918	—	12	—	37.5	**WB1630088-2**
	38.89	91	13.5	15.918	—	12	—	36	**WB1630091C**
	38.89	91.5	17.56	15.918	12	12	14.5	33	**WB1630091D**
	38.89	91.85	20.45	15.918	—	12.675	—	29.34	**WB1630092-1**

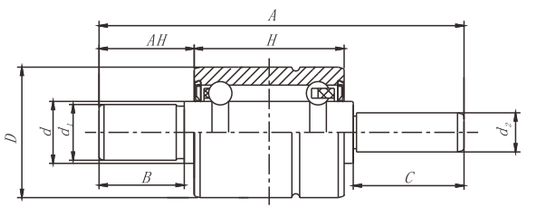




WB 1630 series

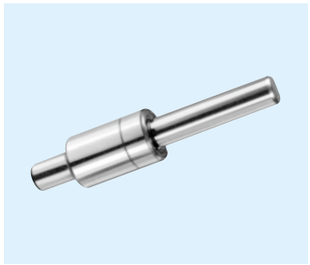
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	92	16.5	15.918	12	12	14.5	34.5	WB1630092D
	38.89	92	—	16	—	—	—	—	WB1630092-2
	38.89	92.48	25.12	15.918	—	12.037	—	26.06	WB16300992
	38.89	92.5	16.5	15.918	—	12	—	34.5	WB1630093D
	38.89	93	18.5	15.918	—	12	—	32.6	WB1630093-1
	38.89	93	18.5	15.918	—	—	—	—	WB1630093
	38.89	93.25	16.25	16	12	12	14.5	35.75	WB1630093
	38.89	94.5	35.11	15.918	—	—	—	—	WB1630094
	38.89	94.6	19.2	15.918	—	12	—	33.5	WB1630095
	38.89	96.5	17.87	15.918	—	12.052	—	35.45	WB1530096
	30	97	—	15.918	—	—	—	—	WB1630097
	38.89	97.51	23.49	15.918	—	—	—	—	WB1630098-1
	38.89	97.65	19.05	15.918	—	12.675	—	36.53	WB1630098-2
	38.89	97.82	17.88	15.918	—	—	—	—	WB1630098-3
	38.89	97.65	—	15.918	—	—	—	—	WB1630098-6
	38.89	98	17	15.918	—	—	—	—	WB1630098A
	38.89	98	20	15.918	—	—	—	—	WB1630098-4
	38.89	98	16.5	15.918	—	—	—	—	WB1630098W
	38.89	98	16	15.918	—	12	—	40.6	WB1630098C
	38.89	98	17.06	15.918	—	—	—	—	WB1630098CA
	38.89	98.04	18.51	15.918	—	12.235	—	38	WB1630098-5
	38.89	98.5	22.55	15.918	—	12	—	33.76	WB1630099
	38.89	98.5	16.5	15.918	12	12	—	40.5	WB1630099-1
	38.89	98.88	23.62	15.918	15	15	21.13	32.51	WB1630099-2
	38.89	98.5	16.25	16	12	12	14.5	50.25	WB1630099-3
	36.5	100	23.5	15.918	—	—	—	—	WB1530100
	38.89	100	24	15.918	—	12	—	35	WB1630100
	39	100	21	15.918	—	12	—	37.5	WB1630100-1
	38.89	101	24	15.918	14	12	20.5	35.1	WB1630101D

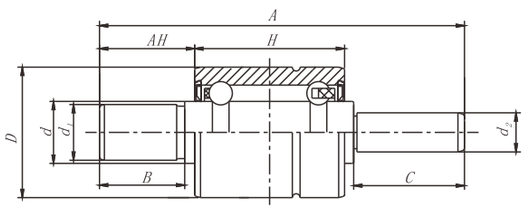




WB 1630 series

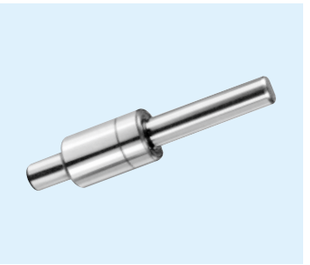
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	101	25	16	—	12	—	35	WB1630101
	38.89	101.24	29	15.918	12.007	12.687	25.4	31.01	WB1630101-1
	38.89	101.2	21.8	15.918	—	—	—	—	WB1630101-2
	38.89	101.5	17.5	15.938	—	—	—	—	WB1630102
	38.89	101.5	17.5	15.918	—	—	—	—	WB1630102-1
	38.89	102.01	16.92	15.918	—	—	—	—	WB1630102-3
	38.89	102.26	35	15.918	15	15	32.92	26.04	WB1630102-4
	38.89	102.5	22	15.918	—	12.675	—	38.5	WB1630102A
	38.89	102.62	24.45	15.918	—	12.674	—	38.1	WB1630102-5
	38.89	102.74	35.02	15.918	12.7	12.014	30.5	23.75	WB1630103-1
	38.89	102.74	28.77	15.918	12.014	12.7	25.5	32	WB1630103-2
	38.89	102.87	22.7	15.918	—	12.675	—	38.1	WB1630103-3
	38.89	102.87	23.11	15.918	—	—	—	—	WB1630103-4
	38.89	103	16.51	15.918	—	12	—	43	WB1630103D
	38.89	103.2	23.42	15.918	—	—	—	—	885140
	38.89	104	16.25	16	12	12	14.5	46.5	WB1630104
	38.89	103.5	21.56	15.918	—	12	—	39.75	WB1630104-2
	38.89	103.51	19.56	15.918	—	12	—	42	WB1630104-3
	39	103.65	21.5	15.92	—	12	—	36	WB1630104D
	38.89	103.84	22.33	15.918	—	—	—	—	WB1630104-4
	38.89	104	—	15.918	—	12	—	35.1	WB1630104-5
	38.89	103.5	21.58	15.918	12	12	18.26	39.75	WB1630104-6
	38.89	105.3	16.2	16	12	12	15	48	WB1630105
	38.89	104.65	20.3	15.918	—	—	—	—	WB1630105-1
	38.89	104.68	27.05	15.918	—	—	—	—	WB1630105-2
	38.89	105	47.16	15.918	—	—	—	—	WB1630105-3
	38.89	105.16	23.95	15.918	—	—	—	—	WB1630105-4
	38.89	105.46	20.63	15.918	—	—	—	—	WB1630105-5
	38.89	105	—	15.918	—	12	—	33.3	WB1630105-6

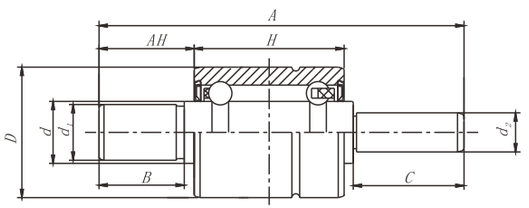




WB 1630 series

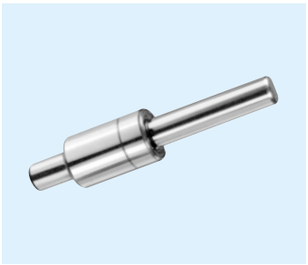
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	105.4	24.21	15.918	—	—	—	—	885159
	38.89	106.17	—	16	—	—	—	—	WB1630106
	38.89	106	26.11	16	—	—	—	—	WB1630106
	38.89	105.5	24.05	15.918	—	12	—	40	WB1630106-1
	38.89	105.5	16.5	15.918	12	12	13.1	46	WB1630106-2
	38.89	106	20.65	15.918	—	—	—	—	WB1630106-3
	38.89	106.17	25.15	15.918	—	—	—	—	WB1630106-4
	38.89	106.17	25.12	15.918	—	12.738	—	38.86	WB1630106-5
	38.89	106.12	18.5	15.918	—	12	—	41	WB1630106-6
	38.89	106.17	20.8	15.918	—	—	—	—	WB1630106-7
	38.9	105.5	23.5	15.918	—	12	—	40.5	WB1630106-8
	38.89	105.7	17.5	16	12	12	16	46.7	WB1630106D-9
	38.89	106	25	16	—	12	—	40	WB1630106D
	38.89	106	30	15.918	—	12	—	34	WB1630106W
	38.9	106	—	16	—	—	—	—	WB1630106G
	38.89	106.5	27.8	15.918	15.01	12.052	26.1	35	WB1630107
	38.89	108	21.5	15.918	—	12	—	44.5	WB1630108
	38.89	109	27.31	16	—	12	—	33.5	WB1630109
	38.89	108.74	27.38	15.918	—	—	—	—	WB1630109-1
	38.89	109.5	25.1	15.918	—	12.04	—	38.8	WB1630110
	38.89	109.52	14.67	15.918	—	—	—	—	WB1630110-1
	38.89	110	23.52	15.918	—	—	—	—	WB1630110-2
	38.89	110	24	15.918	—	12	—	46	8855245
	38.89	113.6	28.96	15.918	—	—	—	—	WB1630111
	38.89	111.51	23.8	15.918	—	—	—	—	WB1630112
	38.89	111.65	21.5	15.918	—	12	—	44	WB1630112D
	38.89	111.75	29.21	15.918	—	—	—	—	WB1630112-1
	38.89	111.91	26.7	15.918	—	—	—	—	WB1630112-2
	38.89	112	25.15	15.918	—	—	—	—	WB1630112-3

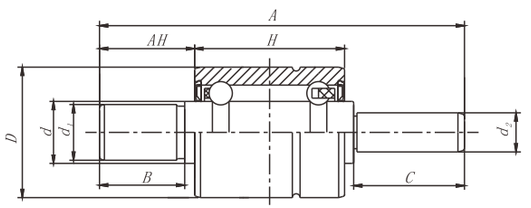




WB 1630 series

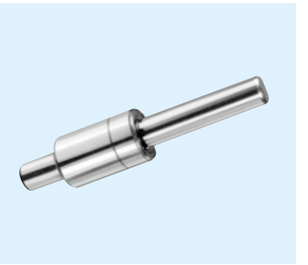
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	112	30	15.918	—	12	—	40.49	WB1630112-4
	38.9	112	27	15.918	—	—	—	—	WB1630112-5
	38.89	112.4	23.37	15.918	—	—	—	—	WB1630112-6
	38.89	112.52	31.26	15.918	—	—	—	—	WB1630113-1
	38.89	112.67	25.52	15.918	—	—	—	—	WB1630113-2
	38.89	112.78	30	15.918	—	—	—	—	WB1630113-3
	38.89	113.11	31.75	15.918	—	—	—	—	WB1630113-4
	38.89	113.21	32	15.918	—	—	—	—	WB1630113-5
	38.9	113.49	27.38	15.918	—	—	—	—	WB1630113-6
	38.89	113	18.5	15.918	—	12	—	53.6	WB1630113-7
	38.89	114	24	15.918	—	—	—	—	WB1630114
	38.89	113.67	31.6	15.918	—	—	—	—	WB1630114-1
	38.89	114.3	32	15.918	—	—	—	—	WB1630114-2
	38.89	113.6	17	15.918	12	12	15	55.6	WB1630114-3
	38.89	114	—	15.918	—	12	—	47.8	WB1630114-4
	38.89	114.54	29.4	15.918	—	12	—	42.5	WB1630115-1
	38.89	114.81	32	15.918	—	—	—	—	WB1630115-2
	38.89	115	26.11	16	—	—	—	—	WB1630115-4
	38.89	115	16.5	15.918	—	12	—	36	WB1630115-5
	38.89	115.51	27.8	15.918	—	—	—	—	885167
	38.89	116	26	15.918	—	12	—	46	WB1630116
	38.89	115.75	26.85	15.918	—	—	—	—	WB1630116-1
	38.89	116	30.06	15.918	—	12	—	43	WB1630116-2
	38.89	116	27.11	15.918	—	—	—	—	WB1630116C
	38.89	116.5	27.5	16	—	13	—	47	WB1630117
	38.89	117.35	33.96	15.918	—	—	—	—	WB1630117-1
	38.9	118.26	14.68	15.918	—	—	—	—	WB1630118
	38.89	119.46	32.54	15.918	—	—	—	—	WB1630119-1
	38.89	119.46	40.82	15.918	—	—	—	—	WB1630119-2

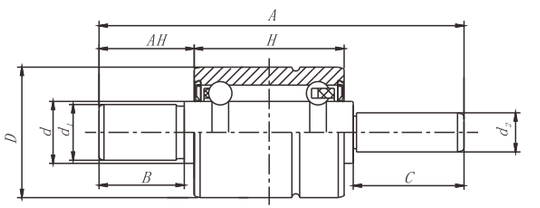




WB 1630 series

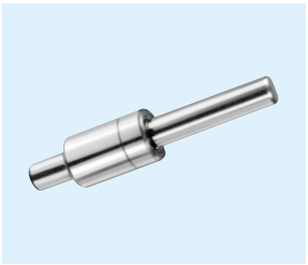
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	119	22.5	15.918	—	12	—	55	WB1630119-3
	38.89	119.07	37.31	15.918	—	—	—	—	885118
	38.89	119.3	37.6	15.918	—	—	—	—	WB1630119C
	38.89	120	31	15.918	—	—	—	—	WB1630120
	38.89	119.84	36.5	15.918	—	—	—	—	WB1630120-1
	38.89	120.9	29.46	15.918	—	—	—	—	WB1630121
	38.9	120.65	38.12	15.918	—	—	—	—	WB1630121-1
	39	121	24	15.918	—	12	—	53.6	WB1630121-2
	38.89	121.5	25	16	—	12	—	47.5	WB1630122D
	38.89	121.87	37.26	15.918	—	—	—	—	WB1630122
	38.89	121.62	31.42	15.918	—	—	—	—	WB1630122-1
	38.89	121.92	41.37	15.918	—	12.675	—	38.1	WB1630122-2
	38.89	122	26.5	15.918	—	—	—	—	WB1630122X
	38.89	122.12	32.96	15.918	—	12.703	—	44.7	WB1630122-3
	38.89	122.17	33.88	15.918	—	—	—	—	WB1630122-4
	38.89	122.22	28.67	15.918	—	—	—	—	WB1630122-5
	38.89	122.22	28.58	15.918	—	—	—	—	WB1630122-6
	38.89	122.22	40.18	15.918	—	—	—	—	885168
	38.89	122.4	33.5	15.918	—	—	—	—	WB1630122-7
	38.9	123.04	36.86	15.918	—	—	—	—	WB1630123
	39	123	—	15.918	—	—	—	—	WB1630123-1
	38.9	123	—	15.976	—	—	—	—	W6484-1
	38.89	124	21	15.918	—	—	—	—	WB1630124
	57.15	123.2	25.5	15.918	—	—	—	—	WB1630124-1
	38.89	124	42.61	15.918	—	12	—	40	WB1630124-2
	38.89	124	41.78	15.918	—	12	—	40.49	WB1630124-3
	38.89	124.4	40	15.918	—	—	—	—	WB1630124-4
	39	124	23	15.918	—	12	—	60.5	WB1630124-5
	38.89	123.67	31.75	15.918	—	—	—	—	WB1630124-6

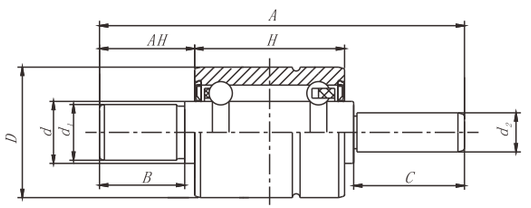




WB 1630 series

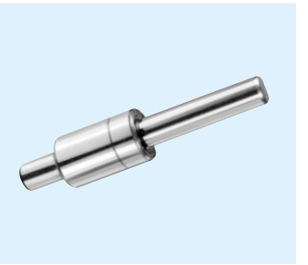
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.9	124.5	30.14	15.918	—	15.817	—	40.64	WB1630125
	38.89	124.97	39.12	15.918	—	—	—	—	WB1630125-1
	38.89	124.5	40	15.918	—	—	—	—	WB1630125-2
	38.89	126	34.3	15.918	—	—	—	—	WB1630126
	38.89	127	36	16	M12	—	19	—	WB1630127
	38.89	127	44.55	15.918	—	—	—	—	WB1630127-1
	38.89	127	37.94	15.918	—	12.7	—	35.56	WB1630127-2
	38.89	127	32.56	15.918	—	—	—	—	WB1630127-3
	38.89	127	27	15.918	—	12	—	59	WB1630127D
	38.89	127.7	22.41	15.918	—	—	—	—	WB1630128
	38.89	127.79	44.45	15.918	—	—	—	—	WB1630128-1
	38.89	127.79	25.8	15.918	—	—	—	—	WB1630128-2
	38.89	129	31.75	15.918	—	—	—	—	885169
	38.89	130	41	15.918	—	—	—	—	WB1630130
	38.89	132.16	50.42	15.918	—	—	—	—	WB1630132
	38.89	132.16	—	15.918	—	—	—	—	885104
	38.89	132.16	47.85	15.918	—	—	—	—	WB1630132-1
	38.89	132.54	40.87	15.918	—	—	—	—	WB1630133
	38.89	132.64	29.77	15.918	—	—	—	—	WB1630133-1
	38.89	132.64	29.77	15.938	—	—	—	—	WB1630133-2
	38.89	133.1	55.35	15.918	—	—	—	—	WB1630133-3
	38.89	133.25	38.86	15.918	—	—	—	—	WB1630133-4
	38.89	133.86	42.65	15.918	—	—	—	—	WB1630134
	38.89	134.92	33.15	15.918	—	—	—	—	WB1630135
	38.89	135.28	50.85	15.918	—	—	—	—	WB1630135-1
	38.89	135.28	45.59	15.918	—	—	—	—	WB1630135-2
	38.89	135.74	44.5	15.969	—	—	—	—	WB1630136
	38.89	135.74	52.4	15.918	—	—	—	—	WB1630136-1
	38.89	136.4	39.1	15.918	—	—	—	—	WB1630136-2

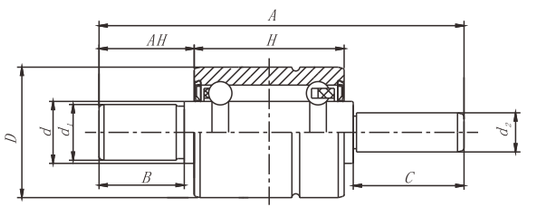




WB 1630, 1635 series

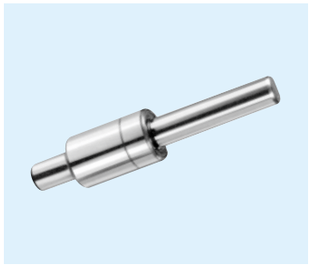
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	137.49	40	15.918	—	—	—	—	**WB1630137**
	38.89	137.67	46.23	15.918	—	—	—	—	**WB1630138**
	38.89	138.1	40.89	15.918	—	—	—	—	**WB1630138-1**
	38.89	138.1	58.34	15.918	—	—	—	—	**WB1630138-2**
	38.89	138.1	45.7	15.918	—	—	—	—	**WB1630138-3**
	38.89	139.32	35.05	15.918	—	—	—	—	**WB1630139**
	38.89	141	49	15.918	—	—	—	—	**WB1630141**
	38.89	141.22	38.93	15.918	—	—	—	—	**WB1630141-1**
	38.89	150	35.1	15.918	—	—	—	—	**WB1630150-1**
	38.89	150	52	15.918	12	M10	50.5	48.5	**WB1630150**
	38.89	154	34.04	15.918	—	—	—	—	**WB1630154**
	38.89	154.23	29.77	15.918	—	—	—	—	**WB1630154-1**
	38.89	154.23	29.77	15.918	—	—	—	—	**WB1630154-2**
	38.89	155.58	69.95	15.918	—	—	—	—	**WB1630156**
	38.89	159.54	76.2	15.918	—	—	—	—	**WB1630160**
	38.89	159.77	62.66	15.918	—	—	—	—	**WB1630160-1**
	38.89	161.47	58.34	15.918	—	—	—	—	**WB1630161**
	38.89	165.85	63.48	15.918	—	—	—	—	**WB1630166**
	38.89	177.09	79.88	15.918	—	—	—	—	**WB1630167**
	22.5	73	14.5	16	—	12	—	34.2	**WB1635073**
	38.9	91	—	15.918	—	—	—	—	**WB1635091**
	38.89	101	—	—	—	12	—	35	**WB1635101**

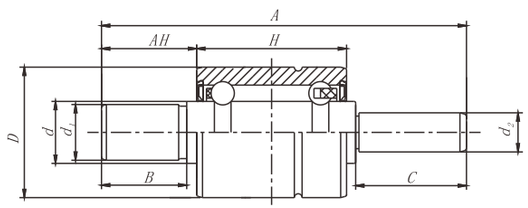




WB 1938 series

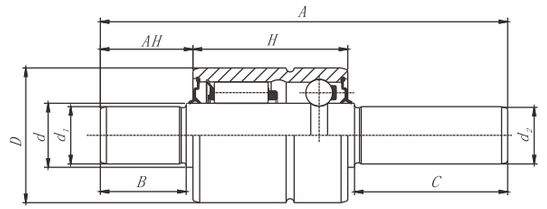
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
38.1	53.975	120.65	24.26	18.961	—	15.918	—	39.675	**WB1938121**
	53.975	95.4	14.7	18.948	15.926	—	11.3	—	**885802**
	41.275	120.65	—	18.961	—	15.918	—	43.26	**885825**
	53.975	125.73	30.861	18.961	15.918	15.918	27.432	37.338	**WB1938126**
	53.975	127	31.369	18.961	—	15.918	—	38.1	**WB1938127**
	53.975	127	26.67	18.961	15.938	15.918	11.634	44.45	**WB1938127-1**
	53.975	127.48	—	18.961	15.918	15.918	13.72	39.29	**885869**
	53.975	127.51	31.115	18.961	15.918	15.918	14.275	39.878	**WB1938127-2**
	53.975	132.08	29.845	18.961	15.918	15.918	12.319	43.18	**WB1938132**
	53.975	134.05	37.605	18.961	—	15.918	—	39.678	**WB1938134**
	53.975	134.112	30.353	18.961	—	15.918	—	47.244	**WB1938134-1**
	53.975	136.652	36.703	18.961	15.918	15.918	33.02	42.418	**WB1938136**
	53.975	136.398	36.195	18.961	15.918	15.918	12.219	43.434	**WB1938136-1**
	53.975	135.636	31.877	18.961	—	15.918	—	47.244	**WB1938136-2**
	53.975	136.779	40.366	18.961	15.918	15.918	14.275	39.873	**WB1938137**
	53.975	140.589	39.624	18.961	—	15.918	—	43.815	**WB1938140**
	53.975	139.7	35.56	18.961	15.918	15.918	15.392	47.752	**WB1938140-1**
	53.975	140	33.7	18.961	15.918	15.918	29	49.146	**WB1938140-2**
	53.975	141.76	—	18.961	—	15.918	—	51.59	**885815**
	53.975	141.757	43.84	18.961	—	15.918	—	41.021	**WB1938142**
	53.975	143.485	30.836	18.961	15.918	15.918	12.243	45.72	**WB1938143**
	53.975	143.256	35.305	18.961	—	15.918	—	49.2	**WB1938143-1**
	53.975	143.764	41.021	18.961	15.918	15.918	37.5	44.577	**WB1938144**
	53.975	145.796	44.704	18.961	—	15.918	—	44.45	**WB1938145**
	53.975	145.796	44.704	18.961	—	15.918	—	40.767	**WB1938145-1**
	53.975	146.05	36.322	18.961	15.918	15.918	13.716	51.562	**WB1938146**
	53.975	146.05	36.322	18.961	15.918	15.918	33.02	51.562	**WB1938146-1**
	53.975	148.84	—	18.961	15.918	15.918	34.92	49.66	**885790**
	53.975	150.52	35.052	18.961	—	15.918	—	58.318	**WB1938150**





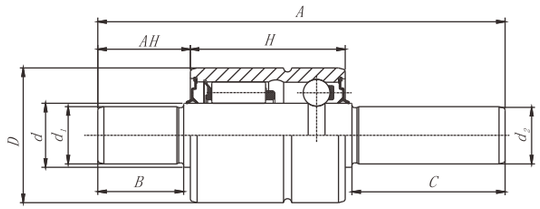
WB 1938, 1940 series

Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
38.1	41.275	152.4	35.66	18.961	15.918	15.918	15.265	60.528	**WB1938152**
	53.975	153.416	45.72	18.961	—	15.918	—	50.546	**WB1938153**
	53.975	152.908	53.694	18.961	15.918	15.918	28.448	41.783	**WB1938153-1**
	53.975	152.908	46.355	18.961	15.918	15.918	28.575	43.035	**WB1938153-2**
	53.975	154.229	29.769	18.961	15.918	15.918	8.89	57.15	**WB1938154**
	53.975	156.6	—	18.961	—	15.918	—	59.82	**885746**
	53.975	161	—	18.961	15.918	15.918	33.53	55.88	**885884**
40	46	113	23	19	17	15.939	42	20	**WB1940113**
	46	113	17	19	—	12	—	45.5	**WB1940113T**
	46	121.5	23	19	17	15.939	20	50.55	**WB1940122**
	46	123	23	19	15.918	15.918	21	52	**WB1940123**
	46	126	30.2	19	—	12	—	45	**WB1940126**
	46	137	23	18.961	—	12	—	63	**WB1940137**
	46	143	—	19	15.918	15.918	20	72	**WB1940143**
42	46	115.5	43	19	18	18	38.5	24	**WB1942115**



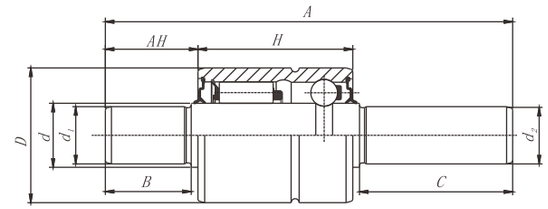
WB 1630 series

Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	28	79	14	16	—	12	—	34.5	**WR1630079**
	28	82.7	17.7	16	—	12	—	34.5	**WR1630083**
	30	84	—	15.918	—	12	—	36.3	**WR1630084**
	30	85	17	15.918	—	12.038	—	36	**WR1630085**
	30	85	17	15.918	—	12	—	12.038	**WR1630085-1**
	38.8	86.5	13.5	15.918	—	12	—	32.7	**WR1630087C**
	38.8	86.5	13.5	15.918	—	12	—	32.7	**WR1630087C-2**
	38.89	91	—	15.918	—	12	—	36	**WR1630091**
	38.89	90.5	14.81	15.918	—	12	—	34.5	**WR1630091-2**
	38.89	92	—	16	—	—	—	—	**WR1630092**
	38.9	93	—	15.918	—	12	—	33	**WR1630093**
	38.9	93.6	—	15.918	—	12	—	38	**WR1630093-1**
	33.38	95	—	15.918	—	12	—	37	**WR1630095**
	30	95.5	16.5	15.918	—	12	—	46.5	**WR1630095-1**
	38.9	95.5	—	15.918	—	—	—	—	**WR1630096**
	38.9	95.8	—	15.918	—	12	—	38.5	**WR1630096-2**
	38.9	96.52	—	15.918	—	—	—	—	**WR1630096-3**
	38.9	98	17	15.918	—	—	—	—	**WR1630098**
	46	100	17	16	—	12	—	34	**WR1630100**
	38.9	101	—	15.918	—	—	—	—	**WR1630101**
	38.9	101.5	—	15.918	—	—	—	—	**WR1630102C**
	38.9	102.2	—	15.918	—	12	—	37.5	**WR1630102-2**
	38.89	101.5	—	15.918	—	12.038	—	41.65	**WR1630102-3**
	38.89	103.12	—	15.918	—	—	—	—	**WR1630103**
	38.89	103.12	27.94	15.918	—	—	—	—	**WR1630103-1**
	39	104.2	16.9	15.918	—	12	—	46.5	**WR1630105-1**
	38.8	104.5	16.5	15.918	—	12	—	48.2	**WR1630105C**
	38.9	106.2	—	15.918	—	12	—	41.4	**WR1630106**
	38.9	105.7	17.5	15.918	12	12	16	46.7	**WR1630106-1**



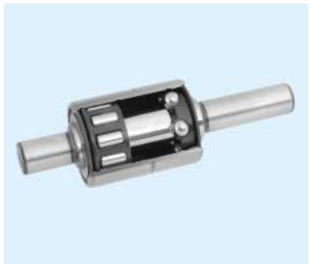
WB 1630, 1635 series

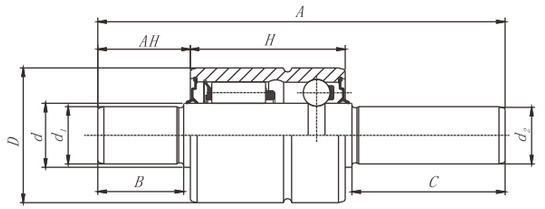
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	106	30	15.918	—	—	—	—	**WR1630106-2**
	38.9	106.3	—	15.918	—	12	—	39.9	**WR1630106-3**
	38.89	107	21.5	15.918	—	12	—	43	**WR1630107**
	38.9	109.5	—	15.918	12.038	12.038	14	51.5	**WR1630110**
	38.89	110	—	15.918	—	—	—	—	**WR1630110-1**
	38.9	115.4	—	15.918	—	12	—	46.1	**WR1630115-1**
	38.89	116.6	—	15.918	—	—	—	—	**WR1630117**
	38.9	124	35	15.918	12	12	33	48	**WR1630124**
	38.9	132.7	—	15.918	—	—	—	—	**WR1630133**
	38.9	135.8	—	15.918	—	12	—	61.9	**WR1630136**
	38.89	139	23.11	15.918	—	—	—	—	**WR1630139**
	38.89	148	28.48	15.918	—	—	—	—	**WR1630148**
35	38.9	96	—	15.918	12.038	12.038	15	37	**WR1635096**
	39	101	25	17.5	15.918	12	23.5	33.8	**WR1635101**
	39	100.5	24	15.918	—	12	—	36	**WR1635101-2**
	39	101	—	15.918	—	12	—	34.8	**WR1635101A-1**
	39	106	42	17.5	15.918	12	28.5	34.8	**WR1635106**
	39	112	—	17.5	15.918	12	41.5	40.5	**WR1635112**
	56	122.6	—	18	—	12	—	35.2	**WR1835123**
	39	124	30	17.5	15.918	12	39.5	28.5	**WR1635124**



WB 1938 series

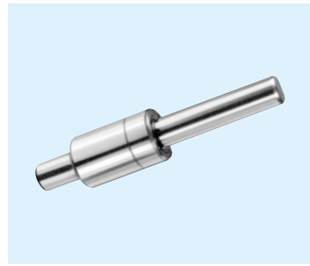
Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
38.1	41.275	99	19.5	19	15.918	12	17.5	36	**WR1938099**
	37	101	—	19	15.918	12	23.2	36.8	**WR1938101**
	41.3	117.2	—	19	—	15.918	—	47.4	**WR1938117**
	54	117.2	—	19	—	15.918	—	43	**WR1938117-1**
	41.3	117.2	—	19	—	15.918	—	48	**WR1938117-2**
	54	120.7	—	19	—	15.918	—	38.4	**WR1938120**
	54	123	—	19	15.918	15.918	13.5	35.5	**WR1938123**
	54	125.3	—	19	—	15.918	—	40	**WR1938125**
	54	126	—	19	15.918	15.918	14	39	**WR1938126**
	54	126	—	19	15.918	12	26.5	37	**WR1938126-1**
	54	127.7	—	19	—	15.918	—	40	**WR1938128**
	54	128.6	—	19	—	15.918	—	54.5	**WR1938129**
	54	128.7	—	19	—	15.918	—	41.7	**WR1938129-1**
	54	129	—	19	—	15.918	—	42.1	**WR1938129-3**
	54	133	—	19	15.918	15.918	12	45	**WR1938133**
	54	134.2	22.4	19	—	15.918	—	49.7	**WR1938134**
	54	134	—	19	—	15.918	—	47.5	**WR1938134-1**
	54	135	—	19	—	15.918	—	41	**WR1938135**
	54	135	—	19	—	15.918	—	41.4	**WR1938135-1**
	54	135	—	19	—	15.918	—	56	**WR1938136-3**
	54	136.5	—	19	—	15.918	—	58.5	**WR1938136-4**
	54	139.2	—	19	—	15.918	—	46.5	**WR1938139**
	54	144.5	—	19	—	15.918	—	46	**WR1938145**
	54	150.5	—	19	15.918	15.918	14	49	**WR1938151**
	54	154.4	—	19	15.918	15.918	9.5	57	**WR1938154**
	54	155.1	—	19	—	15.918	—	59.7	**WR1938155**
	54	156.5	—	19	15.918	15.918	15	53	**WR1938157**
	54	158.1	—	19	15.918	15.918	14.3	57	**WR1938158**
	54	165.3	—	19	—	15.918	—	70.4	**WR1938165**
	54	166.5	—	19	—	15.918	—	64	**WR1938166**

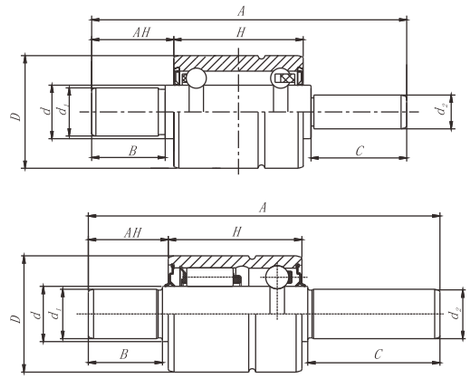




WR 20, 22, 25, 32 series

Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
40	42	105	—	20	—	15.918	—	40.5	**WR2040105**
	44	111.5	—	20	—	15.918	—	41	**WR2040112**
	50	151	—	20	—	16	—	44	**WR2040151**
42	46	115.5	—	20	—	13	—	38.5	**WR2042115**
	46	110.8	—	22	—	12	—	33.8	**WR2242111**
	56	138.5	—	22	—	15.918	—	52.5	**WR2242136**
47	62.5	165	—	22	—	17	—	55.5	**WR2247165**
52	52	133	—	25	—	15.92	—	50	**WR2552133**
	56	138	—	25	—	15.92	—	50	**WR2552138**
	56	138	—	25	—	15.92	—	50	**WR2552138C**
	56	138	—	25	—	15.92	—	50	**WR2552138-4**
	52	140	—	25	—	15.92	—	47	**WR2552140-1**
	56	143	—	25	—	15.92	—	50	**WR2552143**
	52	145	—	25	—	15.92	—	62	**WR2552145-1**
	56	150	—	25	—	15.92	—	57	**WR2552150**
	56	153	—	25	—	15.92	—	54.5	**WR2552153**
	70	155	—	25	—	15.92	—	50	**WR2552155**
	56	162	—	25	—	15.92	—	59	**WR2552162**
	56	163	—	25	—	15.92	—	50	**WR2552163**
	56	163	—	25	—	15.92	—	50	**WR2552163-1**
	56	164	—	25	—	15.92	—	64	**WR2552164**
	56	165	—	25	—	15.92	—	54.5	**WR2552165**
	56	208	—	25	M14	15.92	18	50	**WR2552208**
55	60	127	—	25	—	15.92	—	40.9	**WR2555127A**
	60	145	—	25	19	15.92	28.5	50	**WR2555145**
58	52	133	—	32	—	15.918	—	51	**WR3258133**
	52	140	—	32	—	15.918	—	51	**WR3258140**
	62.5	152	—	32	—	17	—	62	**WR3258152**
	70	155	—	32	—	15.918	—	51	**WR3258155**
52	78	165.5	—	25	—	15.918	—	50.5	**WR2552165**

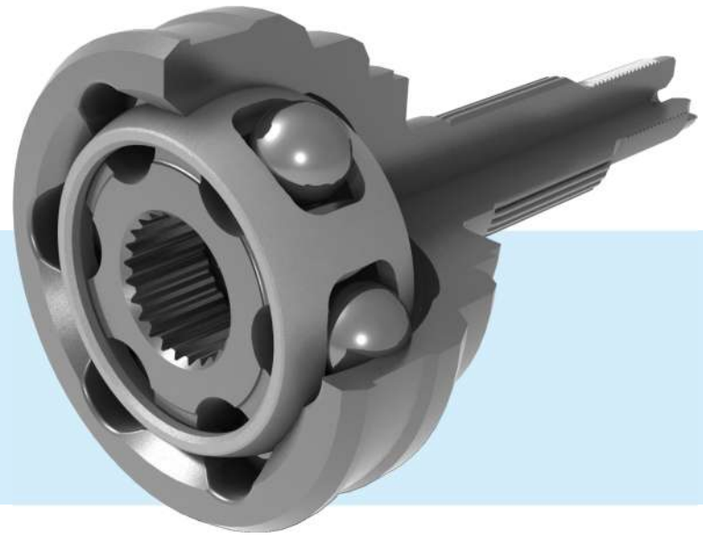




Other series

Boundary dimensions (mm)									Bearing numbers
D	H	A	AH	d	d_1	d_2	B	C	
30	38.89	85	13.06	15	—	12	—	28.5	**WB1530085**
	36	87.5	13.5	15	—	—	—	—	**WB1530088**
	23	75	14	17.208	—	12	—	35.2	**WB1730075**
	23	76	14.8	17.208	—	12	—	36	**WB1730076**
	30	78.65	12	17.2	—	12	—	—	**WB1730079**
	23	79.7	15.5	17.208	—	12	—	38.3	**WB1730080.**
	23	80.5	20.9	17.208	—	12	—	34.7	**WB1730081**
	23	83	15.5	17.208	—	12	—	41.6	**WB1730083**
36	38.89	90.7	14	17	—	15	—	34	**WB1736091**
	38.89	90.7	—	17	—	12	—	34	**WB1736091-1**
40	46	121	27.5	22	17	17	25.5	45.5	**WB1740121**
	46	136	26	19	17	17	24	62	**WB1740136**
30	14	69.9	20.4	17.8	12.4	12.7	19.2	33	**WB1830070**
35	46	119	26.5	18	—	13	—	42.2	**WB1835119**
42	46	109.8	27.7	22	15.915	12	10.5	35	**WB2242110**
	46	118	27.8	22	—	12	—	41.2	**WB2242118**
30	38.89	104.5	17.5	15.918	12	12	16	45.5	**WR1230104**
	38.89	105.65	16.25	15.918	12	12	14.5	48.15	**WR1230106C**
36	52	125.5	25.5	17.5	15	15	22.5	44.5	**WR1536126**
	52	131	33	17.5	15	12	30	44	**WR1536131**
35	46	121	27.5	18	17	17	25.5	45.5	**WR1735121**
	39	103.2	26.5	18	15.918	12	24.5	35.7	**WR1835103**
	46	138	30.5	18	—	17	—	57	**WR1835138**
42	32	83.4	15	22	—	12	—	34.4	**WR2242083**
	32	91.3	17	22	—	12	—	40	**WR2242091**
	56	138	28.5	22	15.918	15.918	25.7	49.1	**WR2242138**

Constant velocity universal joint



Constant velocity universal joint

Constant velocity universal joint and its assembly

Constant velocity universal joint bearings are mainly used in car wheel drive devices to transmit the output torque of the engine to the wheels, and to transmit power between the two shafts whose relative positions are constantly changing so as to drive the car running and ensure that the wheels and the output shaft operate at a constant speed. These kinds of bearings feature a compact structure, easy assembly, large working deflection angle, good lubrication performance, and high transmission efficiency—all while being able to sustain axial sliding and impact load.

1. Categories

(1) Constant velocity universal joints are commonly used on sedan driveshafts, with the output shaft and input shaft rotating at the instant angular velocity ratio equal to 1 during operation.

a. Constant velocity universal joints fall into movable type and fixed type depending on whether there is movement during operation.

b. Constant velocity universal joints fall into end-capped type, shaft sleeve type, flanged type and wheel disk type according to their installation mode and shapes in automobiles.

(2) Constant velocity universal joint assembly is installed in the differential or between terminal reduction gear and the wheel. It is the mechanical component transferring motion and torque, and is composed of two sets or one set of constant velocity joint, intermediate shaft and other parts. They fall into front wheel constant velocity universal joint assembly and rear wheel constant velocity universal joint assembly according to the driving forms.

2. Structure type

(1) Center fixed type constant velocity joint: the constant velocity joint which can only change the operating angle

a. BJ type joints: center fixed type constant velocity joints, with a raceway which is oval in the radial section; steel balls and the raceway are four-point contact type.

b. RF type joints: center fixed type constant velocity joints, with a raceway which is round in the radial section; steel balls and the raceway are two-point contact type.

c. GE type joint: center fixed type constant velocity joints whose three-pin racks are fixed in the housing and ball ring equipped on the three-pin rack and the fork shaft form an operating angle.

(2) Plunging constant velocity joint (constant velocity joints which can change operating angles and make plunging movement)

a. DOJ type constant velocity joint: plunging constant velocity joint

b. TJ type joints: tripod universal joint

c. VL type joints: plunging constant velocity joint whose steel balls are held by the outer spherical cage at the cross of the straight raceways of the inner and outer housings, and the straight raceways of the inner and outer rings tilt reversely with an equal angle in the axial direction.

d. GI type joints: tripod universal joint, with opened housing and compression spring inside.

(3) Type and shape of mounting part

a. End-capped type joints: constant velocity joints whose mounting part is solid shaft

b. Shaft sleeve joints: constant velocity joints whose mounting part is hollow shaft.

c. Flange type joints: constant velocity joints whose mounting part is flange with bolt holes.

d. Wheel disk type joints: constant velocity joints whose mounting part is wheel disk with bolt holes.

(4) Structure of constant velocity universal joint assembly

1) Front-wheel drive constant velocity joint assembly

a. BJ + DOJ or RF + DOJ structure

b. BJ + VL or RF + VL structure

c. BJ+ TJ or RF + TJ structure

d. BJ or RF structure

2) Rear wheel drive constant velocity universal joint assembly

a. BJ + DOJ or RF + DOJ structure

b. BJ+ TJ or RF + TJ structure

c. VL + VL structure

d. TJ + TJ structure

3. Coding method

(1) Constant velocity joint code

Constant velocity joint code consists of structural shape code, dimension code and suffix code orderly.

a. Structure shape code

2 ~ 3 letters are used to represent the structure shapes of the constant velocity joints. Refer to Table 1.

b. Dimension code

2 ~ 3 numbers are used to represent the values of the 100 times intermediate shaft diameter in inch. For nonstandard dimensions, the letter Y shall be added after the number.

c. Suffix code

1 ~ 2 letters are used to represent special requirements and mounting types. Refer to Table 2.

d. Example: BJ 75 Y T M

BJ: The structure form of the constant velocity universal joint is BJ type

75: The diameter of the intermediate shaft is 19mm, and 75 means the inch value multiplied by100.

Y: Inch value of the intermediate shaft diameter multiplied by 100 is non-standard.

T: Special requirement about grease

M: End-capped type

(2) Codes for constant velocity joint assembly

Codes for constant velocity joint assembly consists of basic code and suffix code orderly

a. Basic code

Basic code is made up with the code of the constant velocity joint mounted beside the wheel, plus the code of the constant velocity joint mounted on the differential gear or freduction gear.

b. Suffix code

1 letter is used to represent the structure of the intermediate shaft. Refer to Table 3

c. Example: BJ 75 YTM + TJ 75 YTM/H

/H: welded intermediate shaft

TJ 75 YTM: code of flex type constant velocity joint mounted beside the differential gear or final reduction gear.

BJ 75 YTM: code of constant velocity joint mounted beside the wheel

Table 1

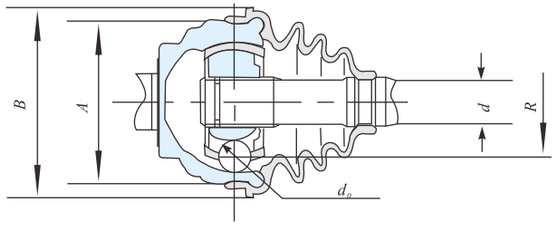
Code	Meaning
BJ	BJ type constant velocity joint
RF	RF constant velocity joint
GE	GE constant velocity joint
DOJ	DOJ constant velocty jolnt
TJ	TJ constant velocity joint
VL	VL constant velocity joint
GI	GI constant velocity joint

Table 2

Code	Meaning
T	Special requirement for lubricating grease
M	End-capped type
Z	Shaft sleeve type
F	Flange type
L	Wheel disk type

Table 3

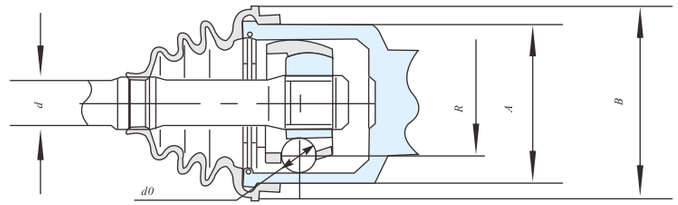
Code	Meaning
/H	Welded intermediate shaft
/K	Hollow intermediate shaft
/S	Solid intermediate ahaft



Boundary dimensions of BJ type universal joints

Unit:mm

Bearing numbers	Boundary dimensions				
	A	*B*	*d*	d_0	*R*
BJ 68	61.6	72	17	12.7	20.96
BJ 71	65.3	76	18	12.7	20.96
BJ 75	70	81	19	14.288	23.57
BJ 87	81	100	22.2	16.699	27.5
BJ 95	90	109	23.9	18.000	29.7
BJ 100	92	109	25.4	19.050	31.43
BJ 112	103	120	28.2	21.431	35.36
BJ 125	115	125	31.8	23.812	39.2
BJ 150	137	157	38.1	28.575	47.15
BJ 175	160	180	44.4	33.338	55.00
BJ 200	182	202	50.8	38.100	62.87
BJ 225	204	225	57.2	42.862	70.72
BJ 250	227	249	63.5	47.625	78.58

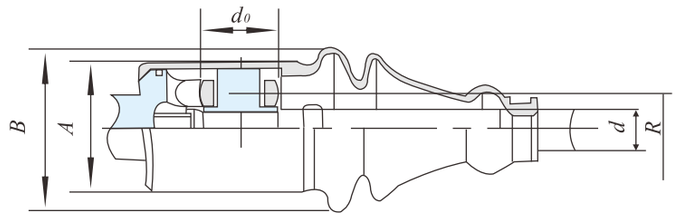


Boundary dimensions of DOJ type universal joints

Unit:mm

Bearing numbers	Boundary dimensions		
	A	*B*	*d*
DOJ 68	61.5	69.5	17
DOJ 71	65.0	74.0	18
DOJ 75	69.0	78.0	19
DOJ 85	72.5	81.3	21.2
DOJ 87	75.7	85.7	22.2
DOJ 92	79.0	89.0	23.3

Bearing numbers	Boundary dimensions		
	A	*B*	*d*
DOJ 96	82.0	91.9	24
DOJ 100	85.5	96.0	25.4
DOJ 110	89.0	99.0	27.6
DOJ 112	95.0	106.0	28.2
DOJ 125	98.5	109.5	31.8



Boundary dimensions of RF type universal joints (Fig as above)

Unit:mm

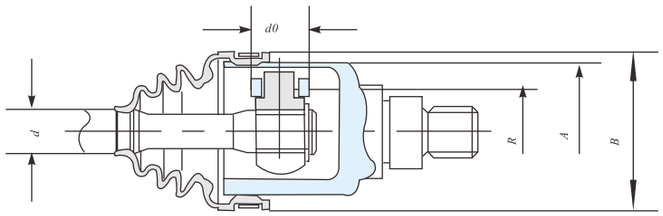
Bearing numbers	Boundary dimensions				
	A	*B*	*d*	d_0	*R*
RF 71	62	74	18	12.700	21.43
RF 80	72	84	20.1	14.600	24.00
RF 87	81	94	22.2	15.875	27.50
RF 103	90	103	26.1	17.462	30.25
RF 112	98	114	28.2	19.050	33.00
RF 134	115	145	34	23.812	39.65
RF 165	138	158	42	28.575	47.5
RF 175	155	175	44.4	31.750	54.05
RF 200	186	208	50.8	38.100	64.00

Boundary dimensions of GI type universal joints

Unit:mm

Bearing numbers	Boundary dimensions				
	A	*B*	*d*	d_0	*R*
GI 75	58	60	19	28.4	18.64
GI 81	63	65	20.6	29.95	20.84
GI 87	69	73	22.2	31.95	23.3
GI 100	72	76	25.4	37.1	23.3
GI 110	82	88	27.6	33.95	28.15
GI 125	87	94	31.8	33.95	30.5
GI 140	116~126	134	35.5	*	*

Remark: * These dimensions can be determined by the manufacturers according to the automobile structure.

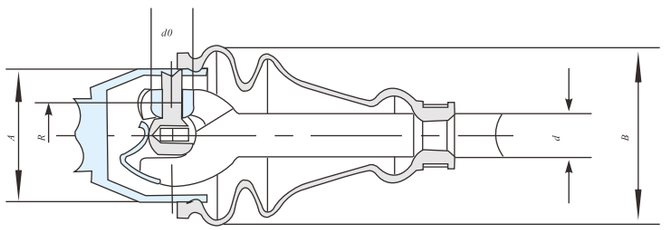


Boundary dimensions of TJ type universal joints

Unit:mm

Bearing numbers	Boundary dimensions		
	A	*B*	*d*
TJ 68	61.5	71.0	17
TJ 71	65.0	74.0	18
TJ 75	68.0	78.0	19
TJ 80	71.4	82.0	20.1
TJ 85	74.6	85.8	21.2

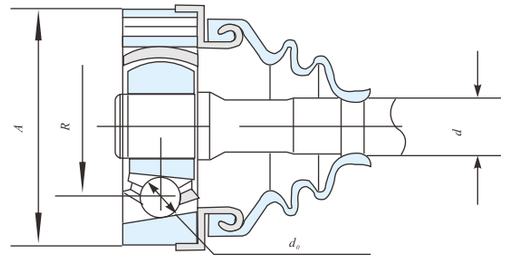
Bearing numbers	Boundary dimensions		
	A	*B*	*d*
TJ 87	78.7	90.2	22.2
TJ 92	81.6	93.1	23.3
TJ 100	89.0	100.5	25.4
TJ 105	95.0	106.7	26.5



Boundary dimensions of GE type universal joints

Unit:mm

Bearing numbers	Boundary dimensions				
	A	*B*	*d*	d_0	*R*
GE 71	58	64	18	16.9	14.1
GE 85	67.6	74	21.2	19.7	16.15
GE 86	67.6	74	21.7	21.9	18.3
GE 100	86	92	25.4	23.7	20.2
GE 105	86	95	26.5	24.9	20.85
GE 112	93	103	28.2	25.9	21.6
GE 118	95	105	30	26.8	22.5
GE 125	99	110	31.8	28.4	24.2

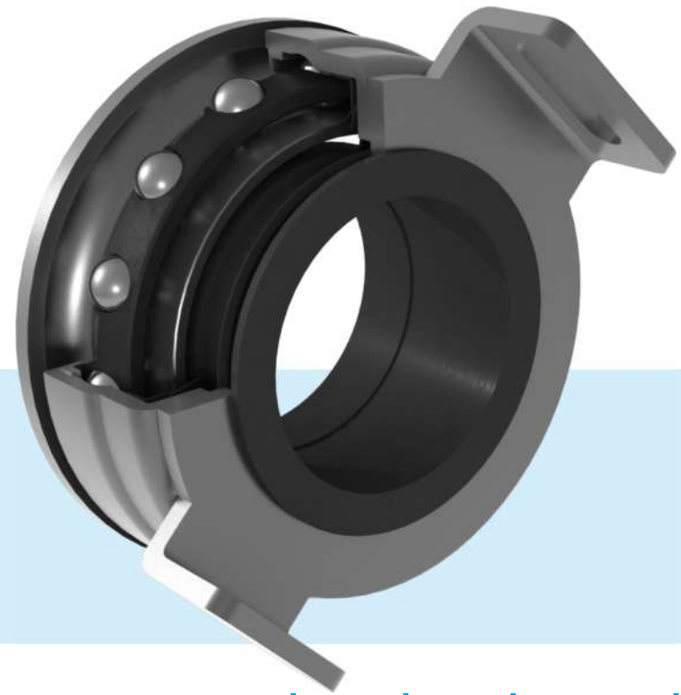


Boundary dimensions of VL type universal joints

Unit:mm

Bearing numbers	Boundary dimensions			
	A	*d*	d_0	*R*
VL 80	80	20.1	15.875	24.0
VL 103	100	26.1	19.050	30.0
VL 112	108	28.2	22.225	31.95
VL 118	120	30	23.812	35.0
VL 125	128	31.8	25.400	38.5

Clutch release bearing



Clutch release bearing

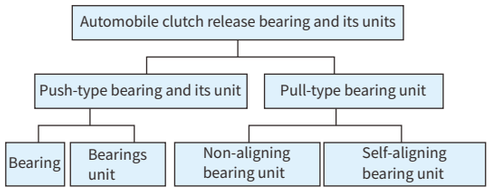
Clutch release bearing

The clutch release bearing is a bearing that acts on the release lever(rod) to separate and engage the clutch. The device comprised of release bearing and declutch shaft sleeve is called clutch release bearing unit. The main function of the clutch release bearing unit is to disengage the clutch through its axial movement, thereby cutting off the power connection between the engine and the transmission or power input shaft, and assisting in starting, stopping, and shifting operations of the vehicle.

1. Category

Automobile clutch release bearings and their units are classified as follows according to the principle of action, structure and working performance. See picture 1.

Picture 1



2. Code method

The clutch release bearing and its units' code are comprised of the contact circle diameter code, structure type code, the ring material code, inner diameter code, bearing nominal width or bearing unit fit width code and release sleeve's material code. The arrangement order is shown in Table 1.

Table 1 clutch release bearing and its units' code method

Diameter code of contact circle or connection groove (pull-type)	Structure type code	Inner diameter code	Nominal width of bearing or bearing unit's fit width code	Separation ring's material code	Supple mentary code

2.1 Contact circle diameter/connection groove diameter code

The code of the contact circle is represented by the diameter of the contact circle in mm (rounded to an integer).

2.2 Structure type code

The type structure code is comprised of capital letters, indicating the shape of the contact round surface of the bearing, the bearing type, the bearing seal type, and the inner and outer ring structure. The arrangement order is shown in Table 2.

Table 2

Type structure code			
Contact circle surface shape code	Type code	Seal type code	Structure code of inner and outer ring

2.3 Shape code of contact circle surface

When the shape of the contact round surface is an arc, it is indicated by the capital letter R, and when it is flat, no code is noted.

2.4 Type code

The type code is represented by 1~2 capital letters. See Table 3.

Table 3

Code	Implication
T	Push-type clutch release bearing
WT	Non-spherical, push-type, outer ring rotating clutch release bearing unit
NT	Non-spherical, push-type, inner ring rotating clutch release bearing unit
NL	Non-aligning, pull-type clutch release bearing unit
CT	Self-aligning, push-type clutch release bearing unit
CL	Self-aligning, pull-type clutch release bearing unit

2.5 Seals code

The seal code is indicated by capital letters. See Table 4.

Table 4

Code	Implication
Z	Stamped housing seals
M	Rubber seals
Note: The clutch bearing unit is not marked with the seal type code	

2.6 Structure code of inner and outer ring

The code will not be noted if the inner and outer rings are machined solid parts. If there is a stamping part, the capital letter "Y" is used; when the flanged ring is a split structure, the capital letter "S" is used.

2.7 Inner diameter code

The bearing inner diameter code is expressed by the bearing's nominal inner diameter (rounded to an integer) in millimeters, and the bearing unit's inner diameter code is expressed by the inner diameter of the release sleeve(rounded to an integer) in millimeters.

2.8 Bearing nominal width code and bearing unit width code

The bearing nominal width code is expressed by the nominal bearing width (rounded up to an integer) in millimeters, and the bearing unit's width code is expressed by the unit's fit width (rounded up to an integer) in millimeters.

2.9 Release sleeve material code

Release sleeve material refers to the material of the contact part of the inner hole of the bearing unit and the tubular extension of the gearbox bearing cover, and the code names are F0, F1, F2...

Letters and numbers are shown in Table 5.

Table 5

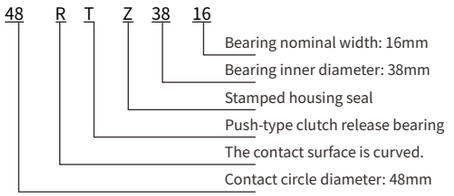
Code	Implication
F0	Engineering plastics
F1	Low-carbon steel
F2	Cast iron
F3	Cast steel
F4	Powder metallurgy
F5	Bearing steel
F6	Aluminum alloy

2.10 Additional code

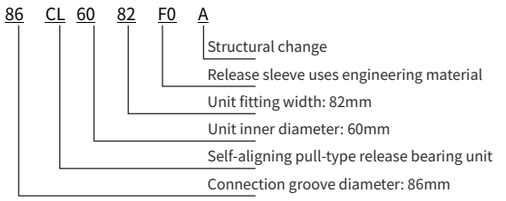
When the code of the bearing unit is exactly the same in front of the material of the release sleeve, if the width of the fitting with the release fork is different or there is a slight change in the structure, the letters A, B, C, … . are used to distinguish them.

2.11 Example

Example 1



Example 2



3. Materials and heat treatment

The bearing rings and rolling elements are generally made of high-carbon chromium bearing steel that complies with the provisions of GB/T18254-2002, and the quality of heat treatment should comply with the provisions of JB/T1255-2001. Other materials that meet the performance requirements can also be adopted, and the heat treatment quality should be in accordance with the relevant standards. The materials and heat treatment quality requirements of other related parts should meet the requirements of product drawings.

4. Sealing and lubrication

Bearing grease should have anti-rust and high& low temperature resistance performance. Passenger car bearings should be able to work normally within -40 °C ~ +120 °C, and commercial vehicle bearings should be able to work normally within -40 °C ~ +140 °C. The technical indicators of its chemical and physical properties should not be lower than the provisions of GB/T5671-1995.

The grease filling amount of the bearing accounts for 20%~50% of the internal volume of the bearing. After the grease filling of the bearing, the grease should be 100% homogenized.

Working environment of release bearing: heavy dust, high temperature, high-speed rotating radial centrifugal force, torsional moment, axial impact load and other harsh working conditions. C&U bearing sealing structure has excellent resistance to dust and grease leakage. Generally, nitrile rubber seals are used, and acrylic rubber or fluororubber seals are used when the requirements are high.

5. Contact angle or clearance

Bearing contact angle or axial/radial clearance is determined according to product drawings or user requirements.

6. Tolerance

6.1 The tolerance of the bearing unit's inner diameter and the fitting width tolerance of the release fork should conform to the requirements of the product drawing.

6.2 In the case of no axial load, the tolerance of the fit width of the bearing unit ΔTos: ±0.5mm for push-type bearings and ±0.8mm for pull-type bearings. When the user has special requirements, it can be negotiated with the manufacturer.

7. Self-alignment amount and self-alignment force

7.1 The self-aligning amount of the self-aligning bearing unit should not be less than 1.0 mm.

7.2 The self-aligning force of the self-aligning bearing unit should meet the requirements of Table 6.

Table 6

d_o / mm		Self-aligning force/N
Over	Up to	
——	35	25～120
35	57	50～200
57	——	100～200

8. Installation and usage

(1) Since the product is a grease bearing, it's not necessary to use gasoline, kerosene, etc to clean the bearing before install. Additionally, no added grease or lubricating oil is required during installation.

(2) Before installation, the appearance of the pressure plate should be checked. The surface is smooth, no looseness, and the height of the diaphragm spring should be the same. The difference between the rotation center position of the installation positioning hole and the shaft rotation center position should not exceed 1mm.

(3) Pay attention to leveling the clutch release lever to ensure that the spring force of the return spring meets the regulations.

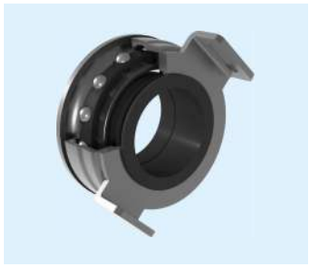
(4) Adjust the free stroke to meet the requirements and prevent the free stroke from being too large or too small.

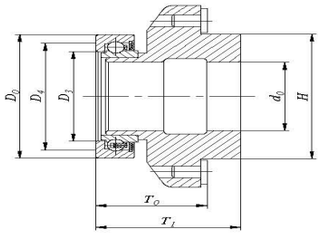
(5) According to the driving operation regulations, half-engaged or half-clutched state of clutch should be avoided and the frequency of clutch use should be reduced.

(6) Tap lightly and easily to make it smoothly combine and separate.

(7) Try to reduce the number of joints and separations, and reduce the impact load.

(8) Check the diaphragm spring when replacing the release bearing, and replace it if the wear is severe.



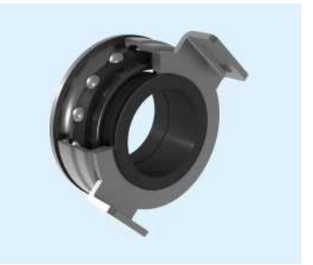


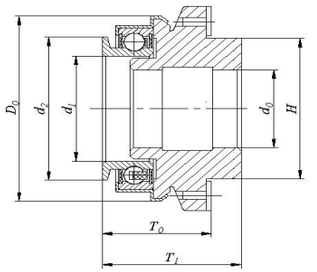
WT/RWT type

WT/RWT type clutch release bearing unit

Unit: mm

Bearing unit numbers	D_0	D_4	d_0	T_0	T_1	H
50RWT3534F3	70	50	35	34	45	44
62RWT3534F2	84	62	35	34	52	48
62RWT3536F2	74	62	35	36	48	48
62RWT3538F2	74	62	35	37.5	47.5	47.8
62RWT4442F2	84	62	44	42	58	53
WT3533F2	84	—	35	33	49	48
WT4432F2	84	—	44	32	47	53.5
WT4433F2	85	—	44	33	45.25	52
WT4434F2	84	—	44	34.4	50.9	54
WT4435F2	84	—	44	34.75	51	52
WT4437F2	84	—	44	36.5	51.5	53
WT4440F2	84	—	44	39.75	53.5	52
WT4832F2	90	—	47.5	32	51	74.9
WT4844F2	102	—	47.5	44	59	85.5
WT4846F2	90	—	47.5	46	61	85.5
WT4850F2	90	—	47.5	50	61	85.5
WT5740F2	102		57	40	55	85.5



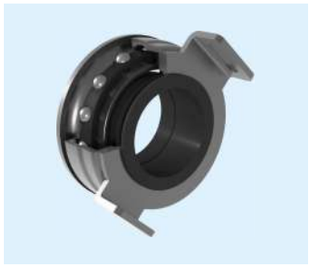


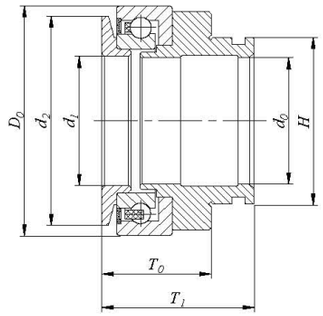
NT/RNT *type*

NT/RNT type clutch release bearing unit

Unit: mm

Bearing unit numbers	D_0	d_1	d_2	d_0	T_0	H	T_1
62RNT4846F3	92	55.7	69	47.5	46	70	57.5
81NT4849F2	114	67.5	92	47.5	59	86	75
81NT4861F2	114	67.5	92	47.5	61	86	75
86NT5760F0	117	72	100	57.1	60	86	80
86NT5760F2	117	67.5	96	57	60	86	80
NT5742F2	120	72	100	57	42	75	62
NT5747F2	114	67.5	92	57	47	86	61.8



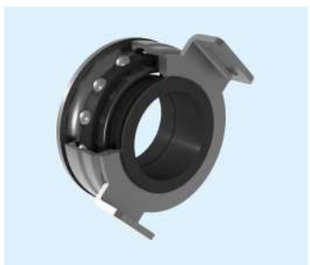


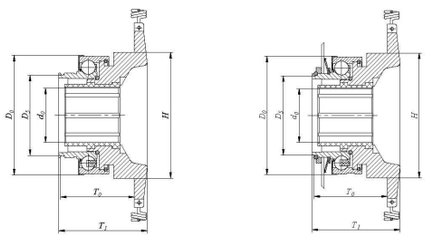
NTS *type*

NTS type clutch release bearing unit

Unit: mm

Bearing unit numbers	D_0	d_2	d_1	d_0	T_0	T_1	H
NTS5468F2	102	100	57.8	54	68	73	80
NTS5471F2	102	100	57.8	54	71	76	116
NTS5740F2	110	100	57.8	57	40	59	75
NTS5742F2	110	100	58	57	42	62	75
NTS5737F3	102	95	57.8	57	37	56	74.9
NTS5737F3A	102	109	57.8	57	37	56	75
NTS5752F3	102	95	57.3	57	52	71	75
NTS5749F3	102	95	57.3	57	49	66	75
NTS5747F3	102	95	57.3	57	47	66	75
NTS5762F3	102	95	57.3	57	62	81	75
NTS5778F3	102	95	57.3	57	78	97	75





a) *Independent bearing unit*

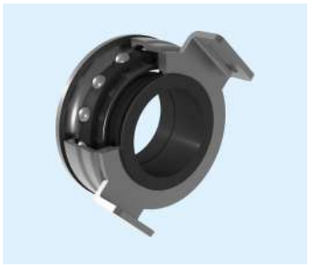
b) *Bearing unit combined with a connector*

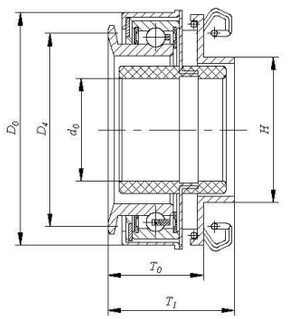
NL *type*

NL type clutch release bearing unit

Unit: mm

Bearing unit numbers	D_0	D_5	d_0	T_0	T_1	H
86NL5876F0	126.9	86	58.4	75.5	91.5	134
86NL6786F0	126.9	86	67	85.5	99.5	134
86NL6773F0	126.8	86	67	72.5	88.5	134

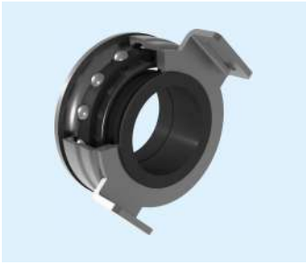


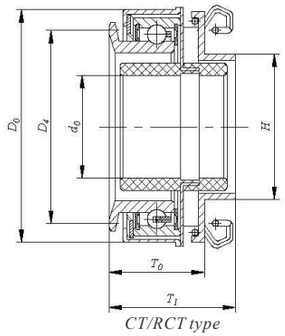


CT/RCT type clutch release bearing unit

Unit: mm

Bearing unit numbers	D_0	D_4	d_0	T_0	T_1	H
34RCT2418F0		34	24	18		29
34RCT2419F0		34	24	19		62
35RCT2419F0		35	24	19		61
35RCT2619F0		35	26	19		35
44RCT2822F0		44	28	22		55
47RCT2921F0		47	29	21		37
47RCT3123F0		47	31	23		68
48RCT3322F0		48	33	22		43
62RCT3551F2		62	35	51		51
80CT4852F0		80	48	52		75
80CT5737F0		80	57	37		78



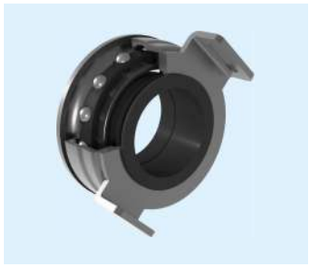


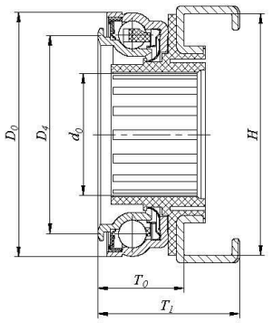
CT/RCT type

CT/RCT type clutch release bearing unit

Unit: mm

Bearing unit numbers	D_0	D_4	d_0	T_0	T_1	H
47RCT3020F0	57	47	30	20	27	44.8
47RCT3221F0	62	47	32	21	35	45
47RCT3223F0	62	47	32	23	37	45
48RCT2822F0	57.5	48	28	22	32	55
48RCT3122F0	70	48	31.75	21	33	60
48RCT3122F0A	62	48	31.75	22	30	42
48RCT3222F0	65.2	48	31.75	22	29	44.8
48RCT3223F0	65.3	48	33	23.4	28	42.5
50RCT2822F0	57.5	50	28	22	32	55
50RCT3322F0	66.25	50	33	22.3	33.3	70.65
50RCT3422F0	65.2	50	34	22	33.3	70.65
52RCT3322F0	66.2	52	33	22	33	80
52RCT3519F0	62	52	35	19	33	62
52RCT3530F0	67.2	52	35	30	40.5	44
54RCT3221F0	62	54	32	21	33	60
54RCT3338F2	75	54	33	37.5	47.5	43.8
54RCT3340F0	75.8	54	33	40	50	43.8
54RCT3346F2	75	54	33	45.5	55.5	43.8
54RCT3346F0	75.8	54	33	45.5	55.5	43.8
54RCT3355F2	75	54	33	54.5	64.5	43.8
54RCT3421F0	71.6	54	34.05	20.5	29	44.5
54RCT3529F0	75	54	35	28.6	38.6	44
54RCT3528F0	83	54	35	28	52	50
54RCT3741F0	67	54	36.5	41	51.5	49.5
62RCT3536F2	98	62	35	36	51	53.5
68RCT3538F2	98	68	35	38	48.5	48
68RCT4036F2	98	68	40	36	46.5	49
68RCT4438F2	98	68	40	38	55	55.8
62RCT4440F2	98	62	44	40	55	53.5
68RCT4456F2	98	68	44	55.5	66	55.8
55CT3338F2	75	55	33	37.5	47.7	44
60CT3338F2	63.5	60	34	14	30.5	68
68CT4852F2	98	68	47.5	51.5	66	86
68CT4864F2	97.6	68	47.5	63.5	80	86
76CT4847F2	110	76	47.5	47	57.5	59.8
76CT4850F2	110	76	47.5	50	71	85.5
78CT4837F3	120	78	47.5	37	56	75
78CT4845F2	120	78	47.5	45	64	74.9
78CT4858F2	120	78	47.5	58	77	74.9
78CT4864F2	120	78	47.5	63.5	79	86
78CT5737F3	120	78	57	37	56	74.9
81CT4846F2	100	81	47.5	46	61	86
78CT5753F2	120	78	57	53	72	74.9
78CT5759F2	120	78	57	59	78	74.9
81CT4859F0	114.6	81	47.5	59	75	86
81CT4860F2	117.6	81	47.5	59.5	76	86
85CT5740F0	120	85	57.2	40	59	74.9
85CT5740F3	125	85	57.175	40	55	85.7
85CT5746F0	120	85	57.2	46	65	74.9
85CT5765F2	125	85	57.715	65	78	85.7
85CT5771F2	120	85	57.2	71	90	74.9
85CT5787F2	125	85	57.715	86.7	104	85.7
85CT6140F2	125	85	60.5	40	55	85.7
86CT5646F3	110	86	56	46	61	74.5
86CT5737F2	110	86	57.1	37	56	74.9
86CT5740F2	110	86	57	40	59	74.9
86CT5740F3	110	86	57	40	50	75
86CT5742F2	110	86	57	42	61	75
86CT5744F2	110	86	57	44	55	75
86CT5760F2	120	86	57	60	80	86
86CT5765F2	125	86	57.715	65	78	85.7
34RCT2418F0	--	34	24	18	--	29
34RCT2419F0	--	34	24	19	--	62
35RCT2419F0	--	35	24	19	--	61
35RCT2619F0	--	35	26	19	--	35
44RCT2822F0	--	44	28	22	--	55
47RCT2921F0	--	47	29	21	--	37
47RCT3123F0	--	47	31	23	--	68
48RCT3322F0	--	48	33	22	--	43
62RCT3551F2	--	62	35	51	--	51
80CT4852F0	--	80	48	52	--	75
80CT5737F0	--	80	57	37		78



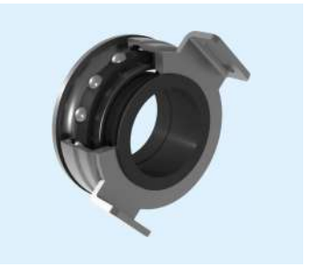


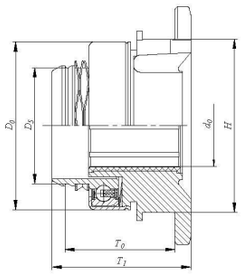
CTY *type*

CTY type clutch release bearing unit

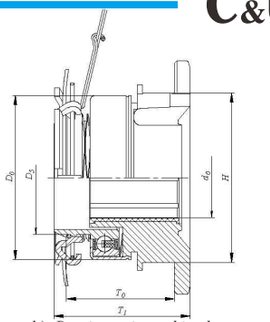
Unit: mm

Bearing unit numbers	D_0	D_4	d_0	T_0	T_1	H
34RCTY2418F0	49	34	24	18.5	28.6	30
34RCTY2419F0	49	34	24	19	28.6	61
37RCTY2619F0	49	37	26	19	25	35
44CTY2619F0	52.5	44	25.5	19	24.6	34.5
44RCTY2822F0	55	44	28	22	32	55
47RCTY2921F0	62	47	29	21	34.5	38
48RCTY3122F0	62	48	29	21	34.5	38
48RCTY3221F0	62	48	31.75	21	35	62
48CTY3525F0	63.5	48	35	25	32.5	46
50RCTY2822F0	55	50	28	22	32	55
50CTY2949F1	65	50	29	49	53	——
50RCTY3322F0	65.2	50	33	22	30.6	70
54RCTY3123F0	64.5	54	31.1	23	31	41.5
55RCTY3219F0	61.7	55	32	19.2	33.7	62





a) *Independent bearing unit*



b) *Bearing unit combined with a connector*

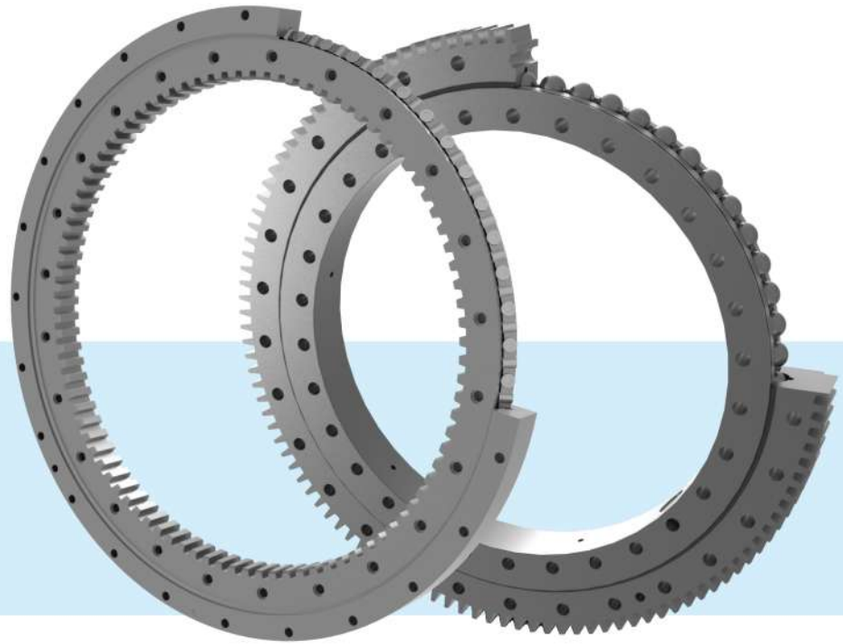
CL *type*

CL type clutch release bearing unit

Unit: mm

Bearing unit numbers	D_0	D_5	d_0	T_0	T_1	H
36CL2716F0	71	36.26	27.08	16.5	26.5	84
36CL2817F0	71	36.26	27.08	16.5	26.5	64.45
44CL3642F0	72	44	36	42	58	68
70CL5782F0	109.8	70	57	82	105.5	77.9
70CL6082F0	109.8	70	60	82	105.5	77.9
86CL5876F0	131.3	85.6	58.2	75.5	97.5	134
86CL5886F0	131.3	85.6	58.2	85.5	107.5	134
86CL6082F0	131.3	85.6	60.2	82	106	127.9
86CL6089F0	131.3	85.6	60.2	89	112	127.9
86CL6090F0	131.3	85.6	60.2	90	112	127.9
86CL6395F0	131.3	85.6	62.9	95	121	85.75

Slewing bearing



Slewing bearing

Selection and calculation of slewing bearing

Selection and calculation of single row ball slewing bearing

1. Calculation of rated static capacity

C_o=f.D.d

In the formula:

C_o- Rated static capacity	kN
f- Static capacity coefficient	0.108kN/mm^2
D- Raceway center diameter	mm
d- Ball nominal diameter	mm

2. Calculate the equivalent axial load based on the combined external load

$C_p=F_a+4370M/D+3.44F_r$

In the formula:

C_p- Equivalent axial load	kN
M- overturning moment	kN.m
F_a- axial force	kN
r- radial force	kN

3. Safety factor calculation

$f_s=C_o/C_p$

The value of f_s can be selected according to the table below

Selection and calculation of three-row roller slewing bearing

1. Calculation of rated static capacity

C_o=f.D.d

In the formula:

C_o- Rated static capacity	kN
f- Static capacity coefficient	0.172kN/mm^2
D- Raceway center diameter	mm
d- Upper row roller diameter	mm

2. Calculate the equivalent axial load based on the combined external load,

$C_p=F_a+4370M/D+3.44F_r$

In the formula:

C_p- Equivalent axial load	kN
M- overturning moment	kN.m
F_a- axial force	kN

3. Safety factor calculation

$f_s=C_o/C_p$

The value of f_s can be selected according to the table below

Slewing bearing safety factor f_s

Work type	Operating characteristic	Mechanical example	fs
Light	Infrequent full load,Rotary balance, low impact	Stacker-reclaimer, truck crane, non-port wheeled crane	1.00—1.15
Medium	Infrequent full load, fast rotation, impact	Tower crane, marine crane, crawler crane	1.15—1.30
Heavy	Often full load, fast rotation, large impact	Grab crane, port crane, single bucket excavator, container crane	1.30—1.45
Extremely heavy	Full load, large impact or harsh workplace conditions	Bucket wheel excavator, tunnel boring machine, metallurgical crane, offshore working platform crane	1.45—1.70

Types and series of slewing bearing

Types and series of slewing bearing

1.Product types:

0- Ball slewing bearings; 1- Roller slewing bearing

2.Raceway structure types:

1- Single row cross roller type and single row four-point contact ball type;
2- double-row ball with different diameter type;
3-Three row roller type

3.Driving method:

0-Toothless;
1-Small modulus of external meshing of involute cylindrical gear;
2-Large modulus of external meshing of involute cylindrical gear ;
3-Small modulus of internal meshing of involute cylindrical gear;
4-Large modulus of internal meshing of involute cylindrical gear

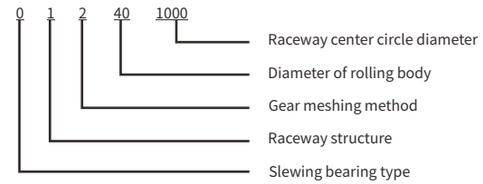
4.Diameter of rolling body (ball or roller)

5.Raceway center circler diameter

Examples of basic model specification

Slewing bearing numbering method

JB / T2300-2018 standard slewing bearing numbering method



1. The toothless single row ball type slewing bearing is composed of an outer gear type inner ring and an inner gear type outer ring with the same center circle diameter of raceway, and its plug and oil hole are arranged on the outer ring.

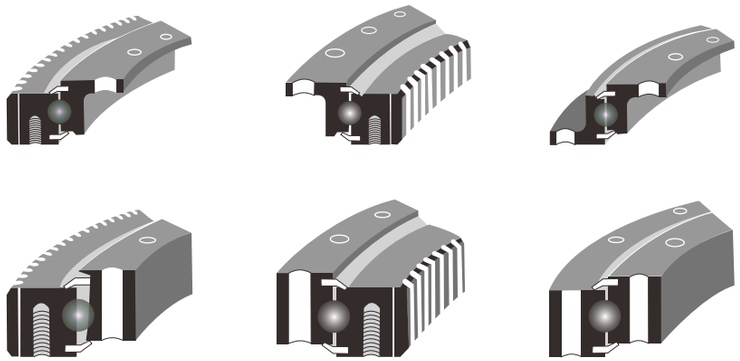
2. The raceway center diameter series of the cross-roller slewing bearing is exactly the same as that of the single row ball slewing bearing. However, the diameter of the rolling elements of the cross roller slewing bearing and the single row ball slewing bearing with the same raceway center diameter are different. The correspondence is as follows:

Units: mm

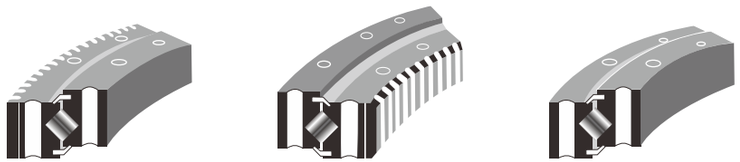
Q series steel ball diameter	20	25	32	40	50	60
J series cylindrical roller diameter	14	18	22	28	36	45

Slewing bearing structure

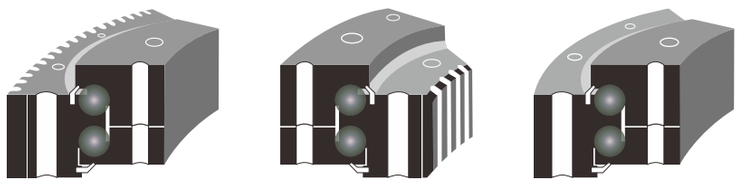
Single row ball slewing bearing



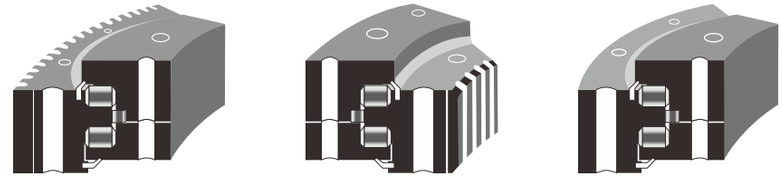
Single row cross roller slewing bearing



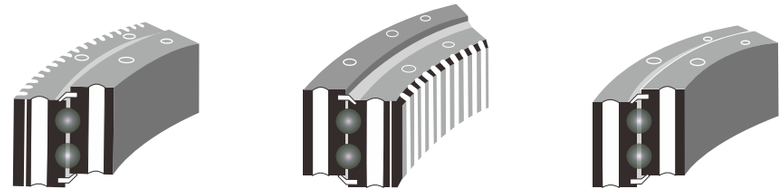
Double-row ball with different diameters slewing bearing



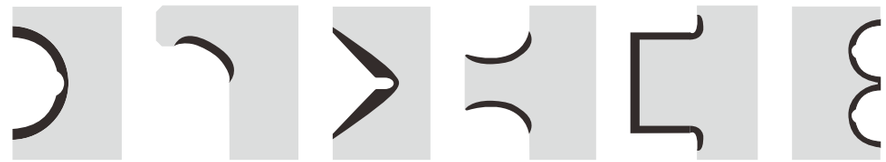
Three row roller slewing bearing



Double row ball slewing bearing



Heat treatment of slewing bearing



Single row four-point contact ball type raceway

Pressing ring raceway of double row ball with different diameter type

Single row cross roller type raceway

Nose ring raceway of double row ball with different diameters type

Three row roller type nose ring raceway

Double row ball type raceway

Full gear quenching

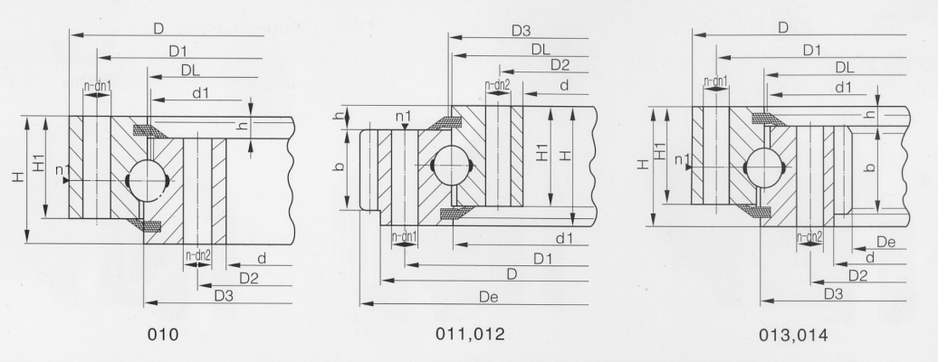
Quenching of gear tooth surface and root

Quenching of gear tooth surface

Structure characteristics, performance, scope of application

Single row four-point contact ball slewing bearing is composed of two seat rings. It is featured by compact structure, light weight and four-point contact between ball and arc raceway. It can bear axial force, radial force and overturning torque at the same time. This type of bearings is applicable to slewing conveyor, welding operating machine, and construction machinery like small-and-medium cranes and excavators.

Notes:
1. n1 is the number of oil holes evenly distributed: M10X1 JB/T7940.2 oil cup;
2. The gear width b can be changed to H-h;
3. The circumferential force of the inner gear is the maximum circumferential force, and the rated circumferential force is 1/2 of the maximum circumferential force.
4. The corrected coefficient of external gear is 0.1 and that of internal gear is 0.2.



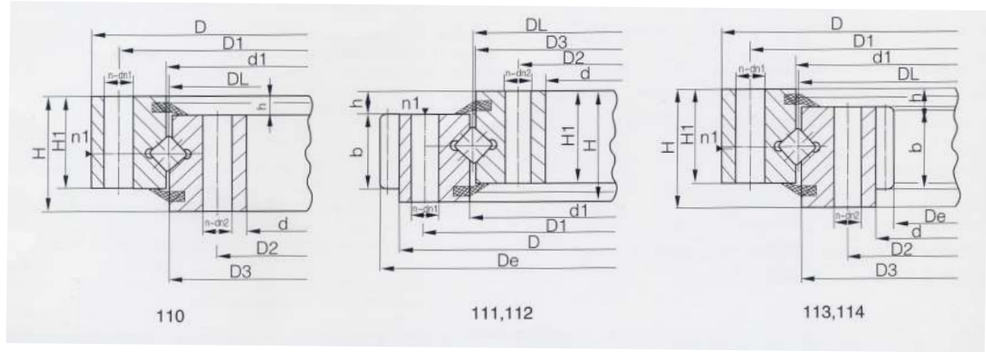
No.	Basic number			Boundary dimensions			Mounting dimensions					Structural dimension					Gear parameter			External gear parameter		Internal gear parameter		Circumferential force of gear		Reference mass (kg)
	Toothless	External gear	Internal gear	D mm	d mm	H mm	D1 mm	D2 mm	n	dn1 dn2 mm		n1	D3 mm	d1 mm	H1 mm	h mm	b mm	X	m mm	De mm	Z	De mm	Z	Normalizing Z 10^4N	Tempering T 10^4N	
1	010.20.200	011.20.200	–	280	120	60	248	152	12	16		2	201	199	50	10	40	0	3	300	98	–	–	–	–	19
2	010.20.224	011.20.224	–	304	144	60	272	176	12	16		2	225	223	50	10	40	0	3	321	105	–	–	–	–	21
3	010.20.250	011.20.250	–	330	170	60	298	202	18	16		2	251	249	50	10	40	0	4	352	86	–	–	–	–	23
4	010.20.280	011.20.280	–	360	200	60	328	232	18	16		2	281	279	50	10	40	0	4	348	94	–	–	–	–	26
5	010.25.315	011.25.315	013.25.315	408	222	70	372	258	20	18		2	316	314	60	10	50	0	5	435	85	190	40	2.9	4.4	41
6	010.25.355	011.25.355	013.25.355	448	262	70	412	298	20	18		2	256	354	60	10	50	0	5	475	93	235	49	2.9	4.4	46
7	010.25.400	011.25.400	013.25.400	493	307	70	457	343	24	18		2	401	399	60	10	50	0	6	528	86	276	48	3.5	5.3	54
8	010.25.450	011.25.450	013.25.450	543	357	70	507	393	24	18		2	451	499	60	10	50	0	6	576	94	324	56	3.5	5.3	60
9	010.30(25).500	011.30(25).500 012.30(25).500	013.30(25).500 014.30(25).500	602	398	80	566	434	20	18		4	501	499	70	10	60	+0.5	5 6	629 628.8	123 102	367 368.4	74 62	3.7 4.5	5.2 6.2	85
10	010.30(25).560	011.30(25).560 012.30(25).560	013.30(25).560 014.30(25).560	662	458	80	626	494	20	18		4	561	559	70	10	60	+0.5	5 6	689 688.8	135 112	427 428.4	86 72	3.7 4.5	5.2 6.2	95
11	010.30(25).630	011.30(25).630 012.30(25).630	013.30(25).630 014.30(25).630	732	528	80	696	564	24	18		4	631	629	70	10	60	+0.5	6 8	722.8 774.4	126 94	494.4 491.2	83 62	4.5 6.0	6.2 8.3	110
12	010.30(25).710	011.30(25).710 012.30(25).710	013.30(25).710 014.30(25).710	812	608	80	776	644	24	18		4	711	709	70	10	60	+0.5	6 8	850.8 854.4	139 104	572.4 571.2	96 72	4.5 6.0	6.2 8.3	120
13	010.40(30).800	011.40(30).800 012.40(30).800	013.40(30).800 014.40(30).800	922	678	100	878	722	30	22		6	801	798	90	10	80	+0.5	8 10	966.4 968	118 94	635.2 634	80 64	8.0 10.0	11.1 14.0	220
14	010.40(30).900	011.40(30).900 012.40(30).900	013.40(30).900 014.40(30).900	1022	778	100	978	822	30	22		6	901	898	90	10	80	+0.5	8 10	1062.4 1068	130 104	739.2 734	93 74	8.0 10.0	11.1 14.0	240
15	010.40(30).1000	011.40(30).1000 012.40(30).1000	013.40(30).1000 014.40(30).1000	1122	878	100	1078	922	36	22		6	1001	998	90	10	80	+0.5	10 12	1188 1185.6	116 96	824 820.8	83 69	10.0 12.0	14.0 16.7	270
16	010.40(30).1120	011.40(30).1120 012.40(30).1120	013.40(30).1120 014.40(30).1120	1242	998	100	1198	1042	36	22		6	1121	1118	90	10	80	+0.5	10 12	1298 1305.6	127 106	944 940.8	95 79	10.0 12.0	14.0 16.7	300
17	010.45(35).1250	011.45(35).1250 012.45(35).1250	013.45(35).1250 014.45(35).1250	1390	1110	110	1337	1163	40	26		5	1251	1248	100	10	90	+0.5	12 14	1449.6 1453.2	118 101	1048.8 1041.6	88 75	13.5 15.8	18.8 21.9	420
18	010.45(35).1400	011.45(35).1400 012.45(35).1400	013.45(35).1400 014.45(35).1400	1540	1260	110	1487	1313	40	26		5	1401	1398	100	10	90	+0.5	12 14	1605.6 1607.2	131 112	1192.8 1195.6	100 86	13.5 15.8	18.8 21.9	480
19	010.45(35).1600	011.45(35).1600 012.45(35).1600	013.45(35).1600 014.45(35).1600	1740	1460	110	1687	1513	45	26		5	1601	1598	100	10	90	+0.5	14 16	1817.2 1820.8	127 111	1391.6 1382.4	100 87	15.8 18.1	21.9 25.0	550
20	010.45(35).1800	011.45(35).1800 012.45(35).1800	013.45(35).1800 014.45(35).1800	1940	1660	110	1887	1713	45	26		5	1801	1798	100	10	90	+0.5	14 16	2013.2 2012.8	141 123	1573.6 1574.4	113 99	15.8 18.1	21.9 25.0	610
21	010.60(40).2000	011.60(40).2000 012.60(40).2000	013.60(40).2000 014.60(40).2000	2178	1825	144	2110	1891	48	33		8	2001	1998	132	12	120	+0.5	16 18	2268.8 2264.4	139 123	1734.4 1735.2	109 97	24.1 27.1	33.3 37.5	1100
22	010.60(40).2240	011.60(40).2240 012.60(40).2240	013.60(40).2240 014.60(40).2240	2418	2065	144	2350	2131	48	33		8	2241	2238	132	12	120	+0.5	16 18	2492.8 2498.4	153 136	1990.4 1987.2	125 111	24.1 27.1	33.3 37.5	1250
23	010.60(40).2500	011.60(40).2500 012.60(40).2500	013.60(40).2500 014.60(40).2500	2678	2325	144	2610	2391	56	33		8	2501	2498	132	12	120	+0.5	18 20	2768.4 2776	151 136	2239.2 2228	125 112	27.1 30.1	37.5 41.8	1400
24	010.60(40).2800	011.60(40).2800 012.60(40).2800	013.60(40).2800 014.60(40).2800	2978	2625	144	2910	2691	56	33		8	2801	2798	132	12	120	+0.5	18 20	3074.4 3076	168 151	2527.2 2528	141 127	27.1 30.1	37.5 41.8	1600
25	010.75(50).3150	011.75(50).3150 012.75(50).3150	013.75(50).3150 014.75(50).3150	3376	2922	174	3286	3014	56	45		8	3152	3147	162	12	150	+0.5	20 22	3476 3471.6	171 155	2828 2824.8	142 129	37.7 41.5	52.2 57.4	2800

Remarks: If there is any other requirements, please contact with C&U Group for inquiry.

Structure characteristics, performance, scope of application

Single row cross roller slewing bearing is composed of two seat rings. It is featured by compact structure, light weight, high manufacturing and assembly accuracy and small installation clearance. The roller is cross arranged with a ratio of 1:1. The bearings can withstand axial force, overturning moment and large radial force at the same time, and is widely used in hoisting and conveying machinery, engineering machinery and military products.

Notes:
1. n1 is the number of oil holes evenly distributed: M10X1 JB/T7940.2 oil cup;
2. The gear width b can be changed to H-h;
3. The circumferential force of the inner gear is the maximum circumferential force, and the rated circumferential force is 1/2 of the maximum circumferential force.
4. The corrected coefficient of external gear is 0.1 and that of internal gear is 0.2.



No.	Basic number			Boundary dimensions			Mounting dimensions					Structural dimension					Gear parameter			External gear parameter		Internal gear parameter		Circumferential force of gear		Reference mass (kg)
	Toothless	External gear	Internal gear	D mm	d mm	H mm	D1 mm	D2 mm	n	dn1 dn2 mm		n1	D3 mm	d1 mm	H1 mm	h mm	b mm	X	m mm	De mm	Z	De mm	Z	Normalizing Z 10^4N	Tempering T 10^4N	
1	110.25.500	111.25.500 112.25.500	113.25.500 114.25.500	602	398	75	566	434	20	18		4	498	502	65	10	60	+0.5	5 6	629 628.8	123 102	367 368.4	74 62	3.7 4.5	5.2 6.2	80
2	110.25.560	111.25.560 112.25.560	113.25.560 114.25.560	662	458	75	626	494	20	18		4	558	562	65	10	60	+0.5	5 6	689 688.8	135 112	427 428.4	86 72	3.7 4.5	5.2 6.2	90
3	110.25.630	111.25.630 112.25.630	113.25.630 114.25.630	732	528	75	696	564	24	18		4	628	632	65	10	60	+0.5	6 8	772.8 774.4	126 94	494.4 491.2	83 62	4.5 6.0	6.2 8.3	100
4	110.25.710	111.25.710 112.25.710	113.25.710 114.25.710	812	608	75	776	644	24	18		4	708	712	65	10	60	+0.5	6 8	850.8 854.4	139 104	572.4 571.2	96 72	4.5 6.0	6.2 8.3	110
5	110.28.800	111.28.800 112.28.800	113.28.800 114.28.800	922	678	82	878	722	30	22		6	798	802	72	10	65	+0.5	8 10	966.4 968	118 94	635.2 634	80 64	6.5 8.1	9.1 11.4	170
6	110.28.900	111.28.900 112.28.900	113.28.900 114.28.900	1022	778	82	978	822	30	22		6	898	902	72	10	65	+0.5	8 10	1062.4 1068	130 104	739.2 734	93 74	6.5 8.1	9.1 11.4	190
7	110.28.1000	111.28.1000 112.28.1000	113.28.1000 114.28.1000	1122	878	82	1078	922	36	22		6	998	1002	72	10	65	+0.5	10 12	1188 1185.6	116 96	824 820.8	83 69	8.1 9.7	11.4 13.6	210
8	110.28.1120	111.28.1120 112.28.1120	113.28.1120 114.28.1120	1242	998	82	1198	1042	36	22		6	1118	1122	72	10	65	+0.5	10 12	1298 1305.6	127 106	944 940.8	95 79	8.1 9.7	11.4 13.6	230
9	110.32.1250	111.32.1250 112.32.1250	113.32.1250 114.32.1250	1390	1110	91	1337	1163	40	26		5	1248	1252	81	10	75	+0.5	12 14	1449.6 1453.2	118 101	1048.8 1041.6	88 75	11.3 13.2	15.7 18.2	350
10	110.32.1400	111.32.1400 112.32.1400	113.32.1400 114.32.1400	1540	1260	91	1487	1313	40	26		5	1398	1402	81	10	75	+0.5	12 14	1605.6 1607.7	131 112	1192.8 1195.6	100 86	11.3 13.2	15.7 18.2	400
11	110.32.1600	111.32.1600 112.32.1600	113.32.1600 114.32.1600	1740	1460	91	1687	1513	45	26		5	1598	1602	81	10	75	+0.5	14 16	1817.2 1820.8	127 111	1391.6 1382.4	100 87	13.2 15.1	18.2 22.4	440
12	110.32.1800	111.32.1800 112.32.1800	113.32.1800 114.32.1800	1940	1660	91	1887	1713	45	33		5	1798	1802	81	10	75	+0.5	14 16	2013.2 2012.8	141 123	1573.6 1574.4	113 99	13.2 15.1	18.2 22.4	500
13	110.40.2000	111.40.2000 112.40.2000	113.40.2000 114.40.2000	2178	1825	112	2110	1891	48	33		8	1997	2003	100	12	90	+0.5	16 18	2268.8 2264.4	139 123	1734.4 1735.2	109 97	18.1 20.3	25.0 28.1	900
14	110.40.2240	111.40.2240 112.40.2240	113.40.2240 114.40.2240	2418	2065	112	2350	2131	48	33		8	2237	2243	100	12	90	+0.5	16 18	2492.8 2498.4	153 136	1990.4 1987.2	125 111	18.1 20.3	25.0 28.1	1000
15	110.40.2500	111.40.2500 112.40.2500	113.40.2500 114.40.2500	2678	2325	112	2610	2391	56	33		8	2497	2503	100	12	90	+0.5	18 20	2768.4 2776	151 136	2239.2 2228	125 112	20.3 22.6	28.1 31.3	1100
16	110.40.2800	111.40.2800 112.40.2800	113.40.2800 114.40.2800	2978	2625	112	2910	2691	56	33		8	2797	2803	100	12	90	+0.5	18 20	3074.4 3076	168 151	2527.2 2528	141 127	20.3 22.6	28.1 31.3	1250
17	110.50.3150	111.50.3150 112.50.3150	113.50.3150 114.50.3150	3376	2922	134	3286	3014	56	45		8	3147	3153	122	12	110	+0.5	20 22	3476 3471.6	171 155	2828 2824.8	142 129	27.6 30.4	38.3 42.1	2150

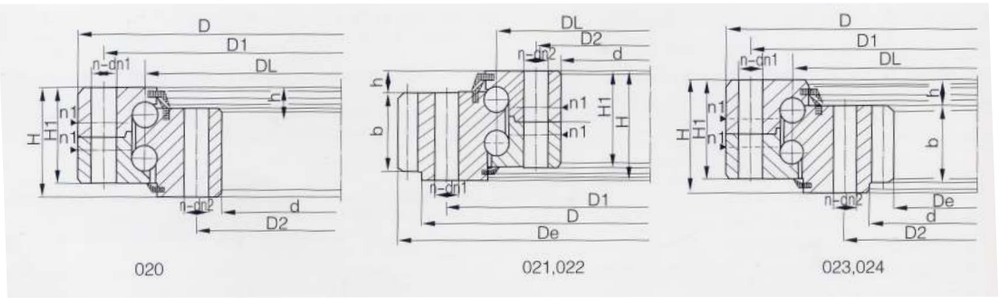
Remarks: If there is any other requirements, please contact with C&U Group for inquiry.

Double row ball with different diameters slewing bearing (02 series) JB/T2300-1999

Structure characteristics, performance, scope of application

The double row ball slewing bearing has three seat rings. The balls and spacers can be directly arranged into the upper and lower raceways. According to the force condition, the balls with different diameters can be arranged in the upper and lower rows.

This kind of open assembly is very convenient. The bearing angle of the upper and lower arc raceways is 90°C. It can bear a great deal of axial force and overturning torque. When the radial force is greater than 0.1 times the axial force, the raceway needs special design. The axial and radial dimensions of the double row ball slewing bearing are relatively large and the structure is firm, which makes it especially suitable for loading and unloading machinery like above-medium-diameter tower crane and truck crane.

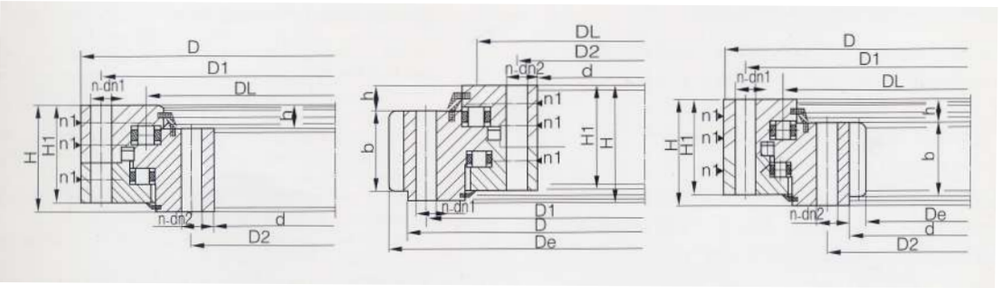


No.	Basic number			Boundary dimensions			Mounting dimensions				Structural dimension			Gear parameter			External gear parameter		Internal gear parameter		Circumferential force of gear		Reference mass (kg)
	Toothless	External gear	Internal gear	D mm	d mm	H mm	D1 mm	D2 mm	n	dn1 dn2 mm	n1	H1 mm	h mm	b mm	X	m mm	De mm	Z	De mm	Z	Normalizing Z 10^4N	Tempering T 10^4N	
1	020.25.500	021.25.500 022.25.500	023.25.500 024.25.500	616	384	106	580	420	20	18	4	96	26	60	+0.5	5 6	644 646.8	126 105	357 350.4	72 59	3.7 4.5	5.2 6.2	100
2	020.25.560	021.25.560 022.25.560	023.25.560 024.25.560	676	444	106	640	480	20	18	4	96	26	60	+0.5	5 6	704 706.8	138 115	417 410.4	84 69	3.7 4.5	5.2 6.2	115
3	020.25.630	021.25.630 022.25.630	023.25.630 024.25.630	746	514	106	710	550	24	18	4	96	26	60	+0.5	6 8	790.8 790.4	129 96	482.4 475.2	81 60	4.5 6.0	6.2 8.3	130
4	020.25.710	021.25.710 022.25.710	023.25.710 024.25.710	826	594	106	790	630	24	18	4	96	26	60	+0.5	6 8	862.8 862.4	141 105	560.4 555.2	94 70	4.5 6.0	6.2 8.3	140
5	020.30.800	021.30.800 022.30.800	023.30.800 024.30.800	942	658	124	898	702	30	22	6	114	29	80	+0.5	8 10	982.4 988	120 96	619.2 614	78 62	8.0 10.0	11.1 14.1	200
6	020.30.900	021.30.900 022.30.900	023.30.900 024.30.900	1042	758	124	998	802	30	22	6	114	29	80	+0.5	8 10	1086.4 1088	133 106	715.2 714	90 72	8.0 10.0	11.1 14.1	250
7	020.30.1000	021.30.1000 022.30.1000	023.30.1000 024.30.1000	1142	858	124	1098	902	36	22	6	114	29	80	+0.5	10 12	1198 1197.6	117 97	814 796.8	82 67	10.1 12.0	14.0 16.7	300
8	020.30.1120	021.30.1120 022.30.1120	023.30.1120 024.30.1120	1262	978	124	1218	1022	36	22	6	114	29	80	+0.5	10 12	1318 1317.6	129 107	924 916.8	93 77	10.1 12.0	14.0 16.7	340
9	020.40.1250	021.40.1250 022.40.1250	023.40.1250 024.40.1250	1426	1074	160	1374	1126	40	26	5	150	39	90	+0.5	12 14	1497.6 1495.2	122 104	1012.8 1013.6	85 73	13.5 15.8	18.8 21.9	580
10	020.40.1400	021.40.1400 022.40.1400	023.40.1400 024.40.1400	1576	1224	160	1524	1272	40	26	5	150	39	90	+0.5	12 14	1641.6 1649.2	134 115	1156.8 1153.6	97 83	13.5 15.8	18.8 21.9	650
11	020.40.1600	021.40.1600 022.40.1600	023.40.1600 024.40.1600	1776	1424	160	1724	1476	45	26	5	150	39	90	+0.5	14 16	1845.2 1852.8	129 113	1349.6 1350.4	97 85	15.8 18.1	21.9 25.0	750
12	020.40.1800	021.40.1800 022.40.1800	023.40.1800 024.40.1800	1976	1624	160	1924	1676	45	26	5	150	39	90	+0.5	14 16	2055.2 2060.8	144 126	1545.6 1542.4	111 97	15.8 18.1	21.9 25.0	820
13	020.50.2000	021.50.2000 022.50.2000	023.50.2000 024.50.2000	2215	1785	190	2149	1851	48	33	8	178	47	120	+0.5	16 18	2300.8 2300.4	141 125	1702.4 1699.2	107 95	24.1 27.1	33.3 37.5	1150
14	020.50.2240	021.50.2240 022.50.2240	023.50.2240 024.50.2240	2455	2025	190	2389	2091	48	33	8	178	47	120	+0.5	16 18	2540.8 2552.4	156 139	1942.4 1933.2	122 108	24.1 27.1	33.3 37.5	1500
15	020.50.2500	021.50.2500 022.50.2500	023.50.2500 024.50.2500	2715	2285	190	2649	2351	56	33	8	178	47	120	+0.5	18 20	2804.4 2816	153 138	2203.2 2188	123 110	27.1 30.1	37.5 41.8	1700
16	020.50.2800	021.50.2800 022.50.2800	023.50.2800 024.50.2800	3015	2585	190	2949	2651	56	33	8	178	47	120	+0.5	18 20	3110.4 3116	170 153	2491.2 2488	139 125	27.1 30.1	37.5 41.8	1900
17	020.60.3150	021.60.3150 022.60.3150	023.60.3150 024.60.3150	3428	2872	226	3338	2962	56	45	8	214	56	150	+0.5	20 22	3536 3537.6	174 158	2768 2758.8	139 126	37.7 41.5	52.2 57.4	3300
18	020.60.3550	021.60.3550 022.60.3550	023.60.3550 024.60.3550	3828	3272	226	3738	3362	56	45	8	214	56	150	+0.5	20 22	3936 3633.6	194 176	3168 3176.8	159 145	37.7 41.5	52.2 57.4	3700
19	020.60.4000	021.60.4000 022.60.4000	023.60.4000 024.60.4000	4278	3722	226	4188	3812	60	45	10	214	56	150	+0.5	22 25	4395.6 4395	197 173	3618.8 3610	165 145	41.5 47.1	57.4 65.2	4200
20	020.60.4500	021.60.4500 022.60.4500	023.60.4500 024.60.4500	4778	4222	226	4688	4312	60	45	10	214	56	150	+0.5	22 25	4879.6 4895	219 193	4122.8 4110	188 165	41.5 47.1	57.4 65.2	4700

Remarks: If there is any other requirements, please contact with C&U Group for inquiry.

Structure characteristics, performance, scope of application

The three row roller slewing bearing has three seat rings. The upper and lower rollers and the radial raceways are separated, so that the load of each row of roller can be accurately determined, and can bear various loads at the same time. It is one of the four products with the largest bearing capacity. Its axle and radial dimensions are large and its structure is firm. It is especially suitable for heavy models requiring larger diameter, such as bucket wheel excavators, wheel lifting, port crane, molten steel table and large tonnage truck crane.



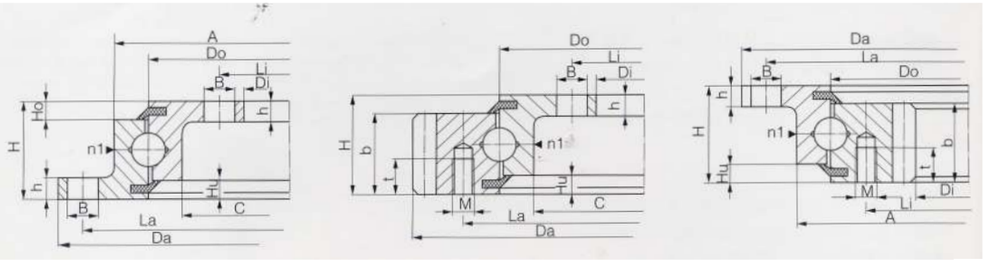
No.	Basic number			Boundary dimensions			Mounting dimensions					Structural dimension			Gear parameter			External gear parameter		Internal gear parameter		Circumferential force of gear		Reference mass (kg)
	Toothless	External gear	Internal gear	D mm	d mm	H mm	D1 mm	D2 mm	n	dn1 dn2 mm		n1	H1 mm	h mm	b mm	X	m mm	De mm	Z	De mm	Z	Normalizing Z 10^4N	Tempering T 10^4N	
1	130.25.500	131.25.500 132.25.500	133.25.500 134.25.500	634	366	148	598	402	24	18		4	138	32	80	+0.5	5 6	664 664.8	130 108	337 338.4	68 57	5.0 6.0	6.7 8.0	200 200
2	130.25.560	131.25.560 132.25.560	133.25.560 134.25.560	694	426	148	658	462	24	18		4	138	32	80	+0.5	5 6	724 724.8	142 118	397 398.4	80 67	5.0 6.0	6.7 8.0	224 224
3	130.25.630	131.25.630 132.25.630	133.25.630 134.25.630	764	496	148	728	532	28	18		4	138	32	80	+0.5	6 8	808.8 806.4	132 98	458.4 459.2	77 58	6.0 8.0	8.0 11.0	262 257
4	130.25.710	131.25.710 132.25.710	133.25.710 134.25.710	844	576	148	808	612	28	18		4	138	32	80	+0.5	6 8	886.8 886.4	145 108	536.4 539.2	90 68	6.0 8.0	8.0 11.0	295 291
5	130.32.800	131.32.800 132.32.800	133.32.800 134.32.800	964	636	182	920	680	36	22		4	172	40	120	+0.5	8 10	1006.4 1008	123 98	595.2 594	75 60	12.1 15.1	16.7 20.9	490 487
6	130.32.900	131.32.900 132.32.900	133.32.900 134.32.900	1064	736	182	1020	780	36	22		4	172	40	120	+0.5	8 10	1102.4 1108	135 108	691.2 694	87 70	12.1 15.1	16.7 20.9	549 564
7	130.32.1000	131.32.1000 132.32.1000	133.32.1000 134.32.1000	1164	836	182	1120	880	40	22		5	172	40	120	+0.5	10 12	1218 1221.6	119 99	784 784.8	79 66	15.1 18.1	20.9 25.1	631 631
8	130.32.1120	131.32.1120 132.32.1120	133.32.1120 134.32.1120	1284	956	182	1240	1000	40	22		5	172	40	120	+0.5	10 12	1338 1341.6	131 109	904 904.8	91 76	15.1 18.1	20.9 25.1	710 710
9	130.40.1250	131.40.1250 132.40.1250	133.40.1250 134.40.1250	1445	1055	220	1393	1107	45	26		5	210	50	150	+0.5	12 14	1509.6 1509.2	123 105	988.8 985.6	83 71	22.9 26.3	31.4 36.6	1137 1126
10	130.40.1400	131.40.1400 132.40.1400	133.40.1400 134.40.1400	1595	1205	220	1543	1257	45	26		5	210	50	150	+0.5	12 14	1665.6 1663.2	136 116	1144.8 1139.6	96 82	22.9 26.3	31.4 36.6	1299 1281
11	130.40.1600	131.40.1600 132.40.1600	133.40.1600 134.40.1600	1795	1405	220	1743	1457	48	26		6	210	50	150	+0.5	14 16	1873.2 1868.8	131 114	1335.6 1334.4	96 84	26.3 30.2	36.6 41.7	1501 1471
12	130.40.1800	131.40.1800 132.40.1800	133.40.1800 134.40.1800	1995	1605	220	1943	1657	48	26		6	210	50	150	+0.5	14 16	2069.2 2076.8	145 127	1531.6 1526.4	110 96	26.3 30.2	36.6 41.7	1682 1697
13	130.45.2000	131.45.2000 132.45.2000	133.45.2000 134.45.2000	2221	1779	231	2155	1845	60	33		6	219	54	160	+0.5	16 18	2300.8 2300.4	141 125	1702.4 1699.2	107 95	32.2 36.2	44.5 50.1	2147 2129
14	130.45.2240	131.45.2240 132.45.2240	133.45.2240 134.45.2240	2461	2019	231	2395	2085	60	33		6	219	54	160	+0.5	16 18	2556.8 2552.4	157 139	1926.4 1933.2	121 108	32.2 36.2	44.5 50.1	2501 2461
15	130.45.2500	131.45.2500 132.45.2500	133.45.2500 134.45.2500	2721	2279	231	2655	2345	72	33		8	219	54	160	+0.5	18 20	2822.4 2816	154 138	2185.2 2188	122 110	36.2 40.2	50.1 55.6	2786 2731
16	130.45.2800	131.45.2800 132.45.2800	133.45.2800 134.45.2800	3021	2579	231	2955	2645	72	33		8	219	54	160	+0.5	18 20	3110.4 3116	170 153	2491.2 2488	139 125	36.2 40.2	50.1 55.6	3067 3079
17	130.50.3150	131.50.3150 132.50.3150	133.50.3150 134.50.3150	3432	2868	270	3342	2958	72	45		8	258	65	180	+0.5	20 22	3536 3537.6	174 158	2768 2758.8	139 126	45.2 48.8	62.6 68.9	5025 5009
18	130.50.3550	131.50.3550 132.50.3550	133.50.3550 134.50.3550	3832	3268	270	3742	3358	72	45		8	258	65	180	+0.5	20 22	3936 3933.6	194 176	3168 3154.8	159 144	45.2 48.8	62.6 68.9	5113 5661
19	130.50.4000	131.50.4000 132.50.4000	133.50.4000 134.50.4000	4282	3718	270	4192	3808	80	45		8	258	65	180	+0.5	22 25	4395.6 4395	197 173	3616.8 3610	165 145	49.8 56.5	68.9 78.3	6508 6449
20	0130.50.4500	131.50.4500 132.50.4500	133.50.4500 134.50.4500	4782	4218	270	4692	4308	80	45		8	258	65	180	+0.5	22 25	4901.6 4895	220 193	4122.8 4110	188 165	49.8 56.5	68.9 78.3	7438 7308

Remarks: If there is any other requirements, please contact with C&U Group for inquiry.

Structure characteristics, performance, scope of application

Single row four-point contact ball slewing bearing (light L series) consists of two seat rings. It is featured by compact structure and light weight, and four-points contact between balls and arc raceway. It can withstand axial force, radial force and overturning torque at the same time.

It is applicable to slewing conveyor, welding machine, automatic cleaning machine and other small and light machinery.



Toothless　　External gear　　Internal gear

	No.	number	Boundary dimensions(mm)			Mounting dimensions(mm)							Structural dimension(mm)						External gear parameter(mm)				Reference mass (kg)
			Da	Di	H	La	Li	na	B/M	ni	B/M	t	n1	h	A	C	Hu	Ho	m	z	k	b	
Toothless	1	LU414.20	518	304	56	455	332	8	18	12	18	–	4	12	453	375	10.5	10.5	–	–	–	–	23.4
	2	LU544.20	648	434	56	585	462	10	18	14	18	–	4	12	583	505	10.5	10.5	–	–	–	–	31.0
	3	LU644.20	748	534	56	685	562	12	18	16	18	–	4	12	683	605	10.5	10.5	–	–	–	–	36.4
	4	LU744.20	848	624	56	785	662	12	18	16	18	–	4	12	783	705	10.5	10.5	–	–	–	–	42.8
	5	LV844.20	948	734	56	885	762	14	18	18	18	–	4	12	883	805	10.5	10.5	–	–	–	–	47.8
	6	LU944.20	1048	834	56	985	862	16	18	20	18	–	4	12	983	905	10.5	10.5	–	–	–	–	53.1
	7	LU1094.20	1198	984	56	1170	1012	16	18	20	18	–	4	12	1133	1055	10.5	10.5	–	–	–	–	61.9
	8	LU955.30	1100	805	90	1060	845	30	22	30	22	–	6	21	1017	893	19	19	–	–	–	–	131
	9	LU1055.30	1200	905	90	1160	945	30	22	30	22	–	6	21	1117	993	19	19	–	–	–	–	145
	10	LU1155.30	1300	1005	90	1260	1045	36	22	36	22	–	6	21	1217	1093	19	19	–	–	–	–	159
	11	LU1255.30	1400	1105	90	1360	1145	42	22	42	22	–	6	21	1317	1193	19	19	–	–	–	–	172
	12	LU1355.30	1500	1205	90	1460	1245	42	22	42	22	–	6	21	1417	1293	19	19	–	–	–	–	186
	13	LU1455.30	1600	1305	90	1560	1345	48	22	48	22	–	6	21	1517	1393	19	19	–	–	–	–	200
External gear	7	LW414.20	504	304	56	455	332	10	M12	12	18	20	4	12	–	375	10.5	–	5	99	–0.1	45.5	29.3
	8	LW544.20	640.8	434	56	545	462	14	M12	14	18	20	4	12	–	505	10.5	–	6	105	–0.1	45.5	39.5
	9	LW644.20	742.8	534	56	685	562	16	M12	16	18	20	4	12	–	605	10.5	–	6	122	–0.1	45.5	47.6
	10	LW744.20	838.8	634	56	765	662	18	M12	16	18	20	4	12	–	705	10.5	–	6	138	–0.1	45.5	53.5
	11	LW844.20	950.4	734	56	885	762	18	M12	18	18	20	4	12	–	805	10.5	–	8	117	–0.1	45.5	65.1
	12	LW944.20	1046.4	834	56	965	862	20	M12	20	18	20	4	12	–	905	10.5	–	8	129	–0.1	45.5	69.6

	No.	number	Boundary dimensions(mm)			Mounting dimensions(mm)							Structural dimension(mm)						External gear parameter(mm)				Reference mass (kg)
			Da	Di	H	La	Li	na	B/M	ni	B/M	t	n1	h	A	C	Hu	Ho	m	z	k	b	
Toothless	1	Lw1094.20	1198.4	984	56	1135	1012	22	M12	20	18	20	4	12	–	1055	10.5	–	8	148	–0.1	45.5	83.0
	2	Lw955.30	1096.2	805	90	1016	845	30	M20	30	22	40	6	21	–	893	19	–	9	120	–0.1	71	165
	3	Lw1055.30	1198	905	90	1116	945	30	M20	30	22	40	6	21	–	993	19	–	10	118	–0.1	71	183
	4	Lw1155.30	1298	1005	90	1216	1045	36	M20	36	22	40	6	21	–	1093	19	–	10	128	–0.1	71	200
	5	Lw1255.30	1398	1105	90	1316	1145	42	M20	42	22	40	6	21	–	1193	19	–	10	138	–0.1	71	216
	6	Lw1355.30	1498	1205	90	1416	1245	42	M20	42	22	40	6	21	–	1293	19	–	10	148	–0.1	71	234
	7	Lw1455.30	1598	1305	90	1516	1345	48	M20	48	22	40	6	21	–	1393	19	–	10	158	–0.1	71	250
External gear	8	LN414.20	518	326.5	56	490	375	8	18	12	M12	20	4	12	453	–	10.5	–	5	67	–0.15	45.5	27.1
	9	LN544.20	648	445.2	56	620	505	10	18	16	M12	20	4	12	583	–	10.5	–	6	76	–0.1	45.5	36.9
	10	LN644.20	748	547.2	56	720	605	12	18	18	M12	20	4	12	683	–	10.5	–	6	93	–0.1	45.5	43.7
	11	LN744.20	848	649.2	56	820	705	12	18	20	M12	20	4	12	783	–	10.5	–	6	110	–0.1	45.5	51.1
	12	LN844.20	948	737.6	56	920	805	14	18	20	M12	20	4	12	883	–	10.5	–	8	94	–0.1	45.5	61.6
	13	LN944.20	1048	841.6	56	1020	905	16	18	22	M12	20	4	12	983	–	10.5	–	8	107	–0.1	45.5	65.8
	7	LN1094.20	1198	985.6	56	1170	1055	16	18	24	M12	20	4	12	1133	–	10.5	–	8	125	–0.1	45.5	80.7
	8	LN955.30	1100	812	90	1060	894	30	22	30	M20	40	6	21	1017	–	19	–	10	83	–0.1	71	159
	9	LN1055.30	1200	912	90	1160	994	30	22	30	M20	40	6	21	1117	–	19	–	10	93	–0.1	71	176
	10	LN1155.30	1300	1012	90	1260	1094	36	22	36	M20	40	6	21	1217	–	19	–	10	103	–0.1	71	192
	11	LN1255.30	1400	1112	90	1360	1194	42	22	42	M20	40	6	21	1317	–	19	–	10	113	–0.1	71	208
	12	LN1355.30	1500	1212	90	1460	1294	42	22	42	M20	40	6	21	1417	–	19	–	10	123	–0.1	71	226
	13	LN1455.30	1600	1312	90	1560	1394	48	22	48	M20	40	6	21	1517	–	19	–	10	133	–0.1	71	243

Remarks: If there is any other requirements, please contact with C&U Group for inquiry.

Appendix

Supplementary table

Appendix 1. Dimensional tolerance of the shaft

Unit: μm

Dimension(mm)		a13		c12		d6		e6		e13		f5		f6		g5		g6	
Over	Up to	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit
3	6	-270	-450	-70	-190	-30	-38	-20	-28	-20	-200	-10	-15	-10	-18	-4	-9	-4	-12
6	10	-280	-500	-80	-230	-40	-49	-25	-34	-25	-245	-13	-19	-13	-22	-5	-11	-5	-14
10	18	-290	-560	-95	-275	-50	-61	-32	-43	-32	-302	-16	-24	-16	-27	-6	-14	-6	-17
18	30	-300	-630	-110	-320	-65	-78	-40	-53	-40	-370	-20	-29	-20	-33	-7	-16	-7	-20
30	40	-310	-700	-120	-370	-80	-96	-50	-66	-50	-440	-25	-36	-25	-41	-9	-20	-9	-25
40	50	-320	-710	-130	-380														
50	65	-340	-800	-140	-440	-100	-119	-60	-79	-60	-520	-30	-43	-30	-49	-10	-23	-10	-29
65	80	-360	-820	-150	-450														
80	100	-380	-920	-170	-520	-120	-142	-72	-94	-72	-612	-36	-51	-36	-58	-12	-27	-12	-34
100	120	-410	-950	-180	-530														
120	140	-460	-1090	-200	-600	-145	-170	-85	-110	-85	-715	-43	-61	-43	-68	-14	-32	-14	-39
140	160	-520	-1150	-210	-610														
160	180	-580	-1210	-230	-630														
180	200	-660	-1380	-240	-700	-170	-199	-100	-129	-100	-820	-50	-70	-50	-79	-15	-35	-15	-44
200	225	-740	-1460	-260	-720														
225	250	-820	-1540	-280	-740														
250	280	-920	-1730	-300	-820	-190	-222	-110	-142	-110	-920	-56	-79	-56	-88	-17	-40	-17	-49
280	315	-1050	-1860	-330	-850														
315	355	-1200	-2090	-360	-930	-210	-246	-125	-161	-125	-1015	-62	-87	-62	-98	-18	-43	-18	-54
355	400	-1350	-2240	-400	-970														
400	450	-1500	-2470	-440	-1070	-230	-270	-135	-175	-135	-1105	-68	-95	-68	-108	-20	-47	-20	-60
450	500	-1650	-2620	-480	-1110														
500	560	—	—	—	—	-260	-304	-145	-189	—	—	—	—	-76	-120	—	—	-22	-66
560	630	—	—	—	—														
630	710	—	—	—	—	-290	-340	-160	-210	—	—	—	—	-80	-130	—	—	-24	-74
710	800	—	—	—	—														
800	900	—	—	—	—	-320	-376	-170	-226	—	—	—	—	-86	-142	—	—	-26	-82
900	1000	—	—	—	—														
1000	1120	—	—	—	—	-350	-416	-195	-261	—	—	—	—	-98	-164	—	—	-28	-94
1120	1250	—	—	—	—														
1250	1400	—	—	—	—	-390	-468	-220	-298	—	—	—	—	-110	-188	—	—	-30	-108
1400	1600	—	—	—	—														

Unit: μm

h4		h5		h6		h7		h8		h9		h10		h11		h13		js4		Dimension(mm)	
Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Over	Up to
0	-4	0	-5	0	-8	0	-12	0	-18	0	-30	0	-48	0	-75	0	-180	+2	-2	3	6
0	-4	0	-6	0	-9	0	-15	0	-22	0	-36	0	-58	0	-90	0	-220	+2	-2	6	10
0	-5	0	-8	0	-11	0	-18	0	-27	0	-43	0	-70	0	-110	0	-270	+2.5	-2.5	10	18
0	-6	0	-9	0	-13	0	-21	0	-33	0	-52	0	-84	0	-130	0	-330	+3	-3	18	30
0	-7	0	-11	0	-16	0	-25	0	-39	0	-62	0	-100	0	-160	0	-390	+3.5	-3.5	30	40
																				40	50
0	-8	0	-13	0	-19	0	-30	0	-46	0	-74	0	-120	0	-190	0	-460	+4	-4	50	65
																				65	80
0	-10	0	-15	0	-22	0	-35	0	-54	0	-87	0	-140	0	-220	0	-540	+5	-5	80	100
																				100	120
0	-12	0	-18	0	-25	0	-40	0	-63	0	-100	0	-160	0	-250	0	-630	+6	-6	120	140
																				140	160
																				160	180
0	-14	0	-20	0	-29	0	-46	0	-72	0	-115	0	-185	0	-290	0	-720	+7	-7	180	200
																				200	225
																				225	250
0	-16	0	-23	0	-32	0	-52	0	-81	0	-130	0	-210	0	-320	0	-810	+8	-8	250	280
																				280	315
0	-18	0	-25	0	-36	0	-57	0	-89	0	-140	0	-230	0	-360	0	-890	+9	-9	315	355
																				355	400
0	-20	0	-27	0	-40	0	-63	0	-97	0	-155	0	-250	0	-400	0	-970	+10	-10	400	450
																				450	500
—	—	—	—	0	-44	0	-70	0	-110	0	-175	0	-280	0	-440	—	—	—	—	500	560
																				560	630
—	—	—	—	0	-50	0	-80	0	-125	0	-200	0	-320	0	-500	—	—	—	—	630	710
																				710	800
—	—	—	—	0	-56	0	-90	0	-140	0	-230	0	-360	0	-560	—	—	—	—	800	900
																				900	1000
—	—	—	—	0	-66	0	-105	0	-165	0	-260	0	-420	0	-660	—	—	—	—	1000	1120
																				1120	1250
—	—	—	—	0	-78	0	-125	0	-195	0	-310	0	-500	0	-780	—	—	—	—	1250	1400
																				1400	1600

Unit: μm

Dimension(mm)		j5		js5		j6		js6		j7		k4		k5		k6		m5	
Over	Up to	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit
3	6	+3	-2	+2.5	-2.5	+6	-2	+4	-4	+8	-4	+5	+1	+6	+1	+9	+1	+9	+4
6	10	+4	-2	+3	-3	+7	-2	+4.5	-4.5	+10	-5	+5	+1	+7	+1	+10	+1	+12	+6
10	18	+5	-3	+4	-4	+8	-3	+5.5	-5.5	+12	-6	+6	+1	+9	+1	+12	+1	+15	+7
18	30	+5	-4	+4.5	-4.5	+9	-4	+6.5	-6.5	+13	-8	+8	+2	+11	+2	+15	+2	+17	+8
30	40	+6	-5	+5.5	-5.5	+11	-5	+8	-8	+15	-10	+9	+2	+13	+2	+18	+2	+20	+9
40	50																		
50	65	+6	-7	+6.5	-6.5	+12	-7	+9.5	-9.5	+18	-12	+10	+2	+15	+2	+21	+2	+24	+11
65	80																		
80	100	+6	-9	+7.5	-7.5	+13	-9	+11	-11	+20	-15	+13	+3	+18	+3	+25	+3	+28	+13
100	120																		
120	140	+7	-11	+9	-9	+14	-11	+12.5	-12.5	+22	-18	+15	+3	+21	+3	+28	+3	+33	+15
140	160																		
160	180																		
180	200	+7	-13	+10	-10	+16	-13	+14.5	-14.5	+25	-21	+18	+4	+24	+4	+33	+4	+37	+17
200	225																		
225	250																		
250	280	+7	-16	+11.5	-11.5	+16	-16	+16	-16	+26	-26	+20	+4	+27	+4	+36	+4	+43	+20
280	315																		
315	355	+7	-18	+12.5	-12.5	+18	-18	+18	-18	+29	-28	+22	+4	+29	+4	+40	+4	+46	+21
355	400																		
400	450	+7	-20	+13.5	-13.5	+20	-20	+20	-20	+31	-32	+25	+5	+32	+5	+45	+5	+50	+23
450	500																		
500	560	—	—	—	—	—	—	+22	-22			—	—	—	—	+44	0	—	—
560	630																		
630	710	—	—	—	—	—	—	+25	-25	—	—	—	—	—	—	+50	0	—	—
710	800																		
800	900	—	—	—	—	—	—	+28	-28	—	—	—	—	—	—	+56	0	—	—
900	1000																		
1000	1120	—	—	—	—	—	—	+33	-33	—	—	—	—	—	—	+66	0	—	—
1120	1250																		
1250	1400	—	—	—	—	—	—	+39	-39	—	—	—	—	—	—	+78	0	—	—
1400	1600																		

m6		n5		n6		p5		p6		r6		r7		Basic tolerance				Dimension(mm)	
Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	IT2	IT3	IT5	IT7	Over	Up to
+12	+4	+13	+8	+16	+8	+17	+12	+20	+12	+23	+15	+27	+15	1.5	2.5	5	12	3	6
+15	+6	+16	+10	+19	+10	+21	+15	+24	+15	+28	+19	+34	+19	1.5	2.5	6	15	6	10
+18	+7	+20	+12	+23	+12	+26	+18	+29	+18	+34	+23	+41	+23	2	3	8	18	10	18
+21	+8	+24	+15	+28	+15	+31	+22	+35	+22	+41	+28	+49	+28	2.5	4	9	21	18	30
+25	+9	+28	+17	+33	+17	+37	+26	+42	+26	+50	+34	+59	+34	2.5	4	11	25	30	40
																		40	50
+30	+11	+33	+20	+39	+20	+45	+32	+51	+32	+60 +62	+41 +43	+71 +73	+41 +43	3	5	13	30	50	65
																		65	80
+35	+13	+38	+23	+45	+23	+52	+37	+59	+37	+73 +76	+51 +54	+86 +89	+51 +54	4	6	15	35	80	100
																		100	120
+40	+15	+45	+27	+52	+27	+61	+43	+68	+43	+88 +90 +93	+63 +65 +68	+103 +105 +108	+63 +65 +68	5	8	18	40	120	140
																		140	160
																		160	180
+46	+17	+51	+31	+60	+31	+70	+50	+79	+50	+106 +109 +113	+77 +80 +84	+123 +126 +130	+77 +80 +84	7	10	20	46	180	200
																		200	225
																		225	250
+52	+20	+57	+34	+66	+34	+79	+56	+88	+56	+126 +130	+94 +98	+146 +150	+94 +98	8	12	23	52	250	280
																		280	315
+57	+21	+62	+37	+73	+37	+87	+62	+98	+62	+144 +150	+108 +114	+165 +171	+108 +114	9	13	25	57	315	355
																		355	400
+63	+23	+67	+40	+80	+40	+95	+68	+108	+68	+166 +172	+126 +132	+189 +195	+126 +132	10	15	27	63	400	450
																		450	500
+70	+26	—	—	+88	+44	—	—	+122	+78	+194 +199	+150 +155	+220 +225	+150 +155	—	—	—	70	500	560
																		560	630
+80	+30	—	—	+100	+50	—	—	+138	+88	+225 +235	+175 +185	+255 +265	+175 +185	—	—	—	80	630	710
																		710	800
+90	+34	—	—	+112	+56	—	—	+156	+100	+266 +276	+210 +220	+300 +310	+210 +220	—	—	—	90	800	900
																		900	1000
+106	+40	—	—	+132	+66	—	—	+186	+120	+316 +326	+250 +260	+355 +365	+250 +260	—	—	—	105	1000	1120
																		1120	1250
+126	+48	—	—	+156	+78	—	—	+218	+140	+378 +408	+300 +330	+425 +455	+300 +330	—	—	—	125	1250	1400
																		1400	1600

Appendix 2. Dimensional tolerance of housing bore

Unit: μm

Dimension(mm)		E7		E10		E11		E12		F6		F7		F8		G6		G7		H6		H7	
Over	Up to	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit
3	6	+32	+20	+68	+20	+95	+20	+140	+20	+18	+10	+22	+10	+28	+10	+12	+4	+16	+4	+8	0	+12	0
6	10	+40	+25	+83	+25	+115	+25	+175	+25	+22	+13	+28	+13	+35	+13	+14	+5	+20	+5	+9	0	+15	0
10	18	+50	+32	+102	+32	+142	+32	+212	+32	+27	+16	+34	+16	+43	+16	+17	+6	+24	+6	+11	0	+18	0
18	30	+61	+40	+124	+40	+170	+40	+250	+40	+33	+20	+41	+20	+53	+20	+20	+7	+28	+7	+13	0	+21	0
30	40	+75	+50	+150	+50	+210	+50	+300	+50	+41	+25	+50	+25	+64	+25	+25	+9	+34	+9	+16	0	+25	0
40	50																						
50	65	+90	+60	+180	+60	+250	+60	+360	+60	+49	+30	+60	+30	+76	+30	+29	+10	+40	+10	+19	0	+30	0
65	80																						
80	100	+107	+72	+212	+72	+292	+72	+422	+72	+58	+36	+71	+36	+90	+36	+34	+12	+47	+12	+22	0	+35	0
100	120																						
120	140	+125	+85	+245	+85	+335	+85	+485	+85	+68	+43	+83	+43	+106	+43	+39	+14	+54	+14	+25	0	+40	0
140	160																						
160	180																						
180	200	+146	+100	+285	+100	+390	+100	+560	+100	+79	+50	+96	+50	+122	+50	+44	+15	+61	+15	+29	0	+46	0
200	225																						
225	250																						
250	280	+162	+110	+320	+110	+430	+110	+630	+110	+88	+56	+108	+56	+137	+56	+49	+17	+69	+17	+32	0	+52	0
280	315																						
315	355	+182	+125	+355	+125	+485	+125	+695	+125	+98	+62	+119	+62	+151	+62	+54	+18	+75	+18	+36	0	+57	0
355	400																						
400	450	+198	+135	+385	+135	+535	+135	+765	+135	+108	+68	+131	+68	+165	+68	+60	+20	+83	+20	+40	0	+63	0
450	500																						
500	560	+215	+145	—	—	—	—	—	—	+120	+76	+146	+76	+186	+76	+66	+22	+92	+22	+44	0	+70	0
560	630																						
630	710	+240	+160	—	—	—	—	—	—	+130	+80	+160	+80	+205	+80	+74	+24	+104	+24	+50	0	+80	0
710	800																						
800	900	+260	+170	—	—	—	—	—	—	+142	+86	+176	+86	+226	+86	+82	+26	+116	+26	+56	0	+90	0
900	1000																						
1000	1120	+300	+195	—	—	—	—	—	—	+164	+98	+203	+98	+263	+98	+94	+28	+133	+28	+66	0	+105	0
1120	1250																						
1250	1400	+345	+220	—	—	—	—	—	—	+188	+110	+235	+110	+305	+110	+108	+30	+155	+30	+78	0	+125	0
1400	1600																						
1600	1800	+390	+240	—	—	—	—	—	—	+212	+120	+270	+120	+350	+120	+124	+32	+182	+32	+92	0	+150	0
1800	2000																						

Unit: μm

H8		H9		H10		H11		H13		J6		JS6		J7		JS7		K5		Dimension(mm)	
Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Over	Up to
+18	0	+30	0	+48	0	+75	0	+180	0	+5	-3	+4	-4	+6	-6	+6	-6	0	-5	3	6
+22	0	+36	0	+58	0	+90	0	+220	0	+5	-4	+4.5	-4.5	+8	-7	+7.5	-7.5	+1	-5	6	10
+27	0	+43	0	+70	0	+110	0	+270	0	+6	-5	+5.5	-5.5	+10	-8	+9	-9	+2	-6	10	18
+33	0	+52	0	+84	0	+130	0	+330	0	+8	-5	+6.5	-6.5	+12	-9	+10.5	-10.5	+1	-8	18	30
+39	0	+62	0	+100	0	+160	0	+390	0	+10	-6	+8	-8	+14	-11	+12.5	-12.5	+2	-9	30	40
																				40	50
+46	0	+74	0	+120	0	+190	0	+460	0	+13	-6	+9.5	-9.5	+18	-12	+15	-15	+3	-10	50	65
																				65	80
+54	0	+87	0	+140	00	+220	0	+540	0	+16	-6	+11	-11	+22	-13	+17.5	-17.5	+2	-13	80	100
																				100	120
+63	0	+100	0	+160	0	+250	0	+630	0	+18	-7	+12.5	-12.5	+26	-14	+20	-20	+3	-15	120	140
																				140	160
																				160	180
+72	0	+115	0	+185	0	+290	0	+720	0	+22	-7	+14.5	-14.5	+30	-16	+23	-23	+2	-18	180	200
																				200	225
																				225	250
+81	0	+130	0	+210	0	+320	0	+810	0	+25	-7	+16	-16	+36	-16	+26	-26	+3	-20	250	280
																				280	315
+89	0	+140	0	+230	0	+360	0	+890	0	+29	-7	+18	-18	+39	-18	+28.5	-28.5	+3	-22	315	355
																				355	400
+97	0	+155	0	+250	0	+400	0	+970	0	+33	-7	+20	-20	+43	-20	+31.5	-31.5	+2	-25	400	450
																				450	500
+110	0	+175	0	+280	0	+440	0	—	0	—	—	+22	-22	—	—	+35	-35	—	—	500	560
																				560	630
+125	0	+200	0	+320	0	+500	0	—	0	—	—	+25	-25	—	—	+40	-40	—	—	630	710
																				710	800
+140	0	+230	0	+360	0	+560	0	—	0	—	—	+28	-28	—	—	+45	-45	—	—	800	900
																				900	1000
+165	0	+260	0	+420	0	+660	0	—	0	—	—	+33	-33	—	—	+52.5	-52.5	—	—	1000	1120
																				1120	1250
+195	0	+310	0	+500	0	+780	0	—	0	—	—	+39	-39	—	—	+62.5	-62.5	—	—	1250	1400
																				1400	1600
+230	0	+370	0	+600	0	+920	0	—	0	—	—	+46	-46	—	—	+75	-75	—	—	1600	1800
																				1800	2000

Unit: μm

Dimension(mm)		K6		K7		M6		M7		N6		N7		P6		P7		R6		R7	
Over	Up to	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit
3	6	+2	-6	+3	-9	-1	-9	0	-12	-5	-13	-4	-16	-9	-17	-8	-20	-12	-20	-11	-23
6	10	+2	-7	+5	-10	-3	-12	0	-15	-7	-16	-4	-19	-12	-21	-9	-24	-16	-25	-13	-28
10	18	+2	-9	+6	-12	-4	-15	0	-18	-9	-20	-5	-23	-15	-26	-11	-29	-20	-31	-16	-34
18	30	+2	-11	+6	-15	-4	-17	0	-21	-11	-24	-7	-28	-18	-31	-14	-35	-24	-37	-20	-41
30	40	+3	-13	+7	-18	-4	-20	0	-25	-12	-28	-8	-33	-21	-37	-17	-42	-29	-45	-25	-50
40	50																				
50	65	+4	-15	+9	-21	-5	-24	0	-30	-14	-33	-9	-39	-26	-45	-21	-51	-35	-54	-30	-60
65	80																	-37	-56	-32	-62
80	100	+4	-18	+10	-25	-6	-28	0	-35	-16	-38	-10	-45	-30	-52	-24	-59	-44	-66	-38	-73
100	120																	-47	-69	-41	-76
120	140	+4	-21	+12	-28	-8	-33	0	-40	-20	-45	-12	-52	-36	-61	-28	-68	-56	-81	-48	-88
140	160																	-58	-83	-50	-90
160	180																	-61	-86	-53	-93
180	200	+5	-24	+13	-33	-8	-37	0	-46	-22	-51	-14	-60	-41	-70	-33	-79	-68	-97	-60	-106
200	225																	-71	-100	-63	-109
225	250																	-75	-104	-67	-113
250	280	+5	-27	+16	-36	-9	-41	0	-52	-25	-57	-14	-66	-47	-79	-36	-88	-85	-117	-74	-126
280	315																	-89	-121	-78	-130
315	355	+7	-29	+17	-40	-10	-46	0	-57	-26	-62	-16	-73	-51	-87	-41	-98	-97	-133	-87	-144
355	400																	-103	-139	-93	-150
400	450	+8	-32	+18	-45	-10	-50	0	-63	-27	-67	-17	-80	-55	-95	-45	-108	-113	-153	-103	-166
450	500																	-119	-159	-109	-172
500	560	0	-44	0	-70	-26	-70	-26	-96	-44	-88	-44	-114	-78	-122	-78	-148	-150	-194	-150	-220
560	630																	-155	-199	-155	-225
630	710	0	-50	0	-80	-30	-80	-30	-110	-50	-100	-50	-130	-88	-138	-88	-168	-175	-225	-175	-225
710	800																	-185	-235	-185	-265
800	900	0	-56	0	-90	-34	-90	-34	-124	-56	-112	-56	-146	-100	-156	-100	-190	-210	-266	-210	-300
900	1000																	-220	-276	-220	-310
1000	1120	0	-66	0	-105	-40	-106	-40	-145	-66	-132	-66	-171	-120	-186	-120	-225	-250	-316	-250	-355
1120	1250																	-260	-326	-260	-365
1250	1400	0	-78	0	-125	-48	-126	-48	-173	-78	-156	-78	-203	-140	-213	-140	-265	-300	-378	-300	-425
1400	1600																	-330	-408	-330	-455
1600	1800	0	-92	0	-150	-58	-150	-58	-208	-92	-184	-92	-242	-170	-262	-170	-320	-370	-462	-370	-520
1800	2000																	-400	-492	-400	-550

Appendix 3. IT values of standard tolerance

Basic dimension (mm)		IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9	IT10	IT11
Over	Up to	The value of the basic tolerance (μm)										
—	3	0.8	1.2	2	3	4	6	10	14	25	40	60
3	6	1	1.5	2.5	4	5	8	12	18	30	48	75
6	10	1	1.5	2.5	4	6	9	15	22	36	58	90
10	18	1.2	2	3	5	8	11	18	27	43	70	110
18	30	1.5	2.5	4	6	9	13	21	33	52	84	130
30	50	1.5	2.5	4	7	11	16	25	39	62	100	160
50	80	2	3	5	8	13	19	30	46	74	120	190
80	120	2.5	4	6	10	15	22	35	54	87	140	220
120	180	3.5	5	8	12	18	25	40	63	100	160	250
180	250	4.5	7	10	14	20	29	46	72	115	185	290
250	315	6	8	12	16	23	32	52	81	130	210	320
315	400	7	9	13	18	25	36	57	89	140	230	360
400	500	8	10	15	20	27	40	63	97	155	250	400
500	630	9	11	16	22	32	44	70	110	175	280	440
630	800	10	13	18	25	36	50	80	125	200	320	500
800	1000	11	15	21	28	40	56	90	140	230	360	560
1000	1250	13	18	24	33	47	66	105	165	260	420	660
1250	1600	15	21	29	39	55	78	125	195	310	500	780
1600	2000	18	25	35	46	65	92	150	230	370	600	920
2000	2500	22	30	41	55	78	110	175	280	440	700	1100
2500	3150	26	36	50	68	96	135	210	330	540	860	1350

IT12	IT13	IT14	IT15	IT16	IT17	IT18	Basic dimension (mm)	
The value of the basic tolerance (μm)							Over	Up to
0.10	0.14	0.25	0.40	0.60	1.0	1.4	—	3
0.12	0.18	0.30	0.48	0.75	1.2	1.8	3	6
0.15	0.22	0.36	0.58	0.90	1.5	2.2	6	10
0.18	0.27	0.43	0.70	1.10	1.8	2.7	10	18
0.21	0.33	0.52	0.84	1.30	2.1	3.3	18	30
0.25	0.39	0.62	1.00	1.60	2.5	3.9	30	50
0.30	0.46	0.74	1.20	1.90	3.0	4.6	50	80
0.35	0.54	0.87	1.40	2.20	3.5	5.4	80	120
0.40	0.63	1.00	1.60	2.50	4.0	6.3	120	180
0.46	0.72	1.15	1.85	2.90	4.6	7.2	180	250
0.52	0.81	1.30	2.10	3.20	5.2	8.1	250	315
0.57	0.89	1.40	2.30	3.60	5.7	8.9	315	400
0.63	0.97	1.55	2.50	4.00	6.3	9.7	400	500
0.70	1.10	1.75	2.8	4.4	7.0	11.0	500	630
0.80	1.25	2.00	3.2	5.0	8.0	12.5	630	800
0.90	1.40	2.30	3.6	5.6	9.0	14.0	800	1000
1.05	1.65	2.60	4.2	6.6	10.5	16.5	1000	1250
1.25	1.95	3.10	5.0	7.8	12.5	19.5	1250	1600
1.50	2.30	3.70	6.0	9.2	15.0	23.0	1600	2000
1.75	2.80	4.40	7.0	11.0	17.5	28.0	2000	2500
2.10	3.30	5.40	8.6	13.5	21.0	33.0	2500	3150

Note: tolerance class IT14-IT18 is not applicable when basic dimension is below 1mm.

Appendix 4. Temperature conversion table °C- °F

$$C=\frac{5}{9}(F-32)$$

$$F=\frac{9}{5}C+32$$

Applicational method of the table: For example, if you want to convert 50°C to° F, see column F on the right side of 50 in the second group, and you will see that 50 °C corresponds to 120° F.

℃	°F	℃	°F	℃	°F	℃	°F
-100	-148	29	84.2	64	147.2	99	210.2
-80	-112	30	86	65	149	100	212
-60	-76	31	87.8	66	150.8	105	221
-40	-40	32	89.6	67	152.6	110	230
-20	-4	33	91.4	68	154.4	120	248
-10	14	34	93.2	69	156.2	130	266
0	32	35	95	70	158	140	284
1	33.8	36	96.8	71	159.8	150	302
2	35.6	37	98.6	72	161.6	160	320
3	37.4	38	100.4	73	163.4	170	338
4	39.2	39	102.2	74	165.2	180	356
5	41	40	104	75	167	190	374
6	42.8	41	105.8	76	168.8	200	392
7	44.6	42	107.6	77	170.6	250	482
8	46.4	43	109.4	78	172.4	300	572
9	48.2	44	111.2	79	174.2	350	662
10	50	45	113	80	176	400	752
11	51.8	46	114.8	81	177.8	450	842
12	53.6	47	116.6	82	179.6	500	932
13	55.4	48	118.4	83	181.4	550	1022
14	57.2	49	120.2	84	183.2	600	1112
15	59	50	122	85	185	650	1202
16	60.8	51	123.8	86	186.8	700	1292
17	62.6	52	125.6	87	188.6	750	1382
18	64.4	53	127.4	88	190.4	800	1472
19	66.2	54	129.2	89	192.2	850	1562
20	68	55	131	90	194	900	1652
21	69.8	56	132.8	91	195.8	950	1742
22	71.6	57	134.6	92	197.6	1000	1832
23	73.4	58	136.4	93	199.4	1100	2012
24	75.2	59	138.2	94	201.2	1200	2192
25	77	60	140	95	203	1300	2372
26	78.8	61	141.8	96	204.8	1400	2552
27	80.6	62	143.6	97	206.6	1500	2732
28	82.4	63	145.4	98	208.4	1600	2912

Appendix 5. Physical and mechanical property of metal materials

Material		Density g/cm³	Coefficient of linear expansion (0°C-100°C)	HB:Rigidity (HB) HB	Modulus of elasticity (Mpa) {kgf/mm²}	Tensile strength (Mpa) {kgf/mm²}	Yield point (Mpa) {kgf/mm²}	Percentage elongation (%)
Bearing steel (quenching)		7.83	12.5×10^{-6}	—	208000 {21200}	1570~1960 {160~200}	—	—
Martensitic stainless steel (9Cr18)		7.68	10.1×10^{-6}	580	200000 {20400}	1960 {200}	1860 {190}	—
Low-carbon steel (C=0.12～0.20%)		7.86	11.6×10^{-6}	100~130	206000 {21000}	373~471 {38~48}	216~294 {22~30}	24~36
Medium-carbon steel (C=0.3～0.5%)		7.84	11.3×10^{-6}	160~200	206000 {21000}	539~686 {55~70}	333~451 {34~46}	14~26
Austenitic stainless steel (0Cr18Ni9)		8.03	16.3×10^{-6}	150	193000 {19700}	588 {60}	245 {25}	60
Cast iron	Gray iron (HT200)	7.3	10.4×10^{-6}	223	148078	More than 200 {20}	—	—
	Nodular graphite cast iron (QT400)	7.0	11.7×10^{-6}	Less than 201	98100 {10000}	More than 400 {41}	—	More than 12
Aluminum		2.69	23.7×10^{-6}	15~26	70600 {7200}	78 {8}	34 {3.5}	35
Zinc		7.14	31×10^{-6}	30~60	92200 {9400}	147 {15}	—	30~40
Copper		8.93	16.2×10^{-6}	50	123000 {12500}	196 {20}	69 {7}	15~20
Brass	(Annealing)	8.5	17.8×10^{-6}	Approx. 45	103000 {10500}	294~343 {30~35}	—	65~75
	(Processing)			85~130		363~539 {37~55}		15~50

Remarks: The rigidity of quenched bearing steel and martensitic stainless steel is generally indicated with HRC, but for the convenience of comparison, it will be converted into HB.

Appendix 6. SI units and conversion

Physical quantities	Unit names	Suffix	SI conversion rate	SI conversion rate	SI unit
Angular degree	Degree Minute Second	° ′ ″	π/180 π/10800 π/648000	Radian	rad
Length	Meter Micrometer Angstrom Sea mile	m μ Å mile	1 10^{-6} 10^{-10} 1852	Meter	m
Area	Square meter Am Hectare	m^2 a ha	1 10^2 10^4	Square meter	m^2
Volume	Cubic meter Liter	m^3 L	1 10^{-3}	Cubic meter	m^3
Mass	Kilogram Ton Atomic mass unit	kg t u	1 10^3 $\approx 1.66057\times10^{-27}$	Kilogram	kg
Time	Second Minute Hour Day	s min h d	1 60 3600 86400	Second	s
Velocity	Meter per second Knot	m/s kn	1 1852/3600	Meter per second	m/s
Frequency and vibration frequency	Cycle	s^{-1}	1	Hz	Hz
Rotate speed	Revolution per minute	rpm	1/60	Revolution per second	r/s
Angular velocity	Radian per second	rad/s	1	Radian per second	rad/s
Acceleration	Meter per square second G	m/s^2 G	1 9.80665	Meter per second	m/s^2
	Weight kilogram Weight ton Dyne	kgf tf dyn	9.80665 9806.65 10^{-5}	Newton	N
	Weight kilogram meter	kgf · m	9.80665	Newton Meter	N · M
TorqueStress and pressure	Weight kilogram per square meter Weight kilogram per square centimeter Weight kilogram per square millimeter	kgf/m^2 kgf/cm^2 kgf/mm^2	9.80665 9.80665×10^4 9.80665×10^6	Pascal	Pa
Pressure	Meter water column Millimeter mercury column Torr Air pressure Bar	mH_2O mmHg Torr atm bar	9806.65 101325/760 101325/760 101325 100000	Pascal	Pa

Physical quantities	Unit names	Suffix	SI conversion rate	SI unit name	SI unit
Energy	Erg Kilocalorie Weight kilogram meter Kilowatt-hour Metric horse power hour Electron volt	erg cal kgf · m kw · h PS · h eV	10^{-7} 4.1859 9.80665 3.60×10^6 $\approx 2.64779\times10^6$ $\approx 1.60219\times10^{-19}$	Joule	J
Power and capacity	Watts Metric horse power Weight kilogram meter per second	W PS kgf · m/s	1 ≈735.5 9.80665	Watts	W
Viscosity	Poise Centipoise Weight kilogram second per square meter	P cP $kgf\cdot s/m^2$	10^{-1} 10^{-3} 9.80665	Pascal second	Pa · s
Kinematic viscosity	Stoke Centistoke	St cSt	10^{-4} 10^{-6}	Square meter per second	m^2/s

Appendix 7. Conversion table between metric system and inch system(inch-mm)

inch		0	1	2	3	4	5	6	7	8
Fraction	Decimal fraction	mm								
0	0.000000	0.0000	25.4000	50.8000	76.2000	101.6000	127.0000	152.4000	177.8000	203.2000
1/64	0.015625	0.3969	25.7969	51.1969	76.5969	101.9969	127.3969	152.7969	178.1969	203.5969
1/32	0.031250	0.7938	26.1938	51.5938	76.9938	102.3938	127.7938	153.1938	178.5938	203.9938
3/64	0.046875	1.1906	26.5906	51.9906	77.3906	102.7906	128.1906	153.5906	178.9906	204.3906
1/16	0.062500	1.5875	26.9875	52.3875	77.7875	103.1875	128.5875	153.9875	179.3875	204.7875
5/64	0.078125	1.9844	27.3844	52.7844	78.1844	103.5844	128.9844	154.3844	179.7844	205.1844
3/32	0.093750	2.3813	27.7813	53.1813	78.5813	103.9813	129.3813	154.7813	180.1813	205.5813
7/64	0.109375	2.7781	28.1781	53.5781	78.9781	104.3781	129.7781	155.1781	180.5781	205.9781
1/8	0.125000	3.1750	28.5750	53.9750	79.3750	104.7750	130.1750	155.5750	180.9750	206.3750
9/64	0.140625	3.5719	28.9719	54.3719	79.7719	105.1719	130.5719	155.9719	181.3719	206.7719
5/32	0.156250	3.9688	29.3688	54.7688	80.1688	105.5688	130.9688	156.3688	181.7688	207.1688
11/64	0.171875	4.3656	29.7656	55.1656	80.5656	105.9656	131.3656	156.7656	182.1656	207.5656
3/16	0.187500	4.7625	30.1625	55.5625	80.9625	106.3625	131.7625	157.1625	182.5625	207.9625
13/64	0.203125	5.1594	30.5594	55.9594	81.3594	106.7594	132.1594	157.5594	182.9594	208.3594
7/32	0.21875	5.5563	30.9563	56.3563	81.7563	107.1563	132.5563	157.9563	183.3563	208.7563
15/64	0.234375	5.9531	31.3531	56.7531	82.1531	107.5531	132.9531	158.3531	183.7531	209.7531
1/4	0.250000	6.3500	31.7500	57.1500	82.5500	107.9500	133.3500	158.7500	184.1500	209.5500
17/64	0.265625	6.7469	32.1469	57.5469	82.9469	108.3469	133.7469	159.1469	184.5469	209.9469
9/32	0.281250	7.1438	32.5438	57.9438	83.3438	108.7438	134.1438	159.5438	184.9438	210.3438
19/64	0.296875	7.5406	32.9406	58.3406	83.7406	109.1406	134.5406	159.9406	185.3406	210.7406
5/16	0.312500	7.9375	33.3375	58.7375	84.1375	109.5375	134.9375	160.3375	185.7375	211.1375
21/64	0.328125	8.3344	33.7344	59.1344	84.5344	109.9344	135.3344	160.7344	186.1344	211.5344
11/32	0.343750	8.7313	34.1313	59.5313	84.9313	110.3313	135.7313	161.1313	186.5313	211.9313
23/64	0.359375	9.1281	34.5281	59.9281	85.3281	110.7281	136.1281	161.5281	186.9281	212.3281
3/8	0.375000	9.5250	34.9250	60.3250	85.7250	111.1250	136.5250	161.9250	187.3250	212.7250
25/64	0.390625	9.9219	35.3219	60.7219	86.1219	111.5219	136.9219	162.3219	187.7219	213.1219
13/32	0.406250	10.3188	35.7188	61.1188	86.5188	111.9188	137.3188	162.7188	188.1188	213.5188
27/64	0.421875	10.7156	36.1156	61.5156	86.9156	112.3156	137.7156	163.1156	188.5156	213.9156
7/16	0.437500	11.1125	36.5125	61.9125	87.3125	112.7125	138.1125	163.5125	188.9125	214.3125
29/64	0.453125	11.5094	36.9094	62.3094	87.7094	113.1094	138.5094	163.9094	189.3094	214.7094
15/32	0.468750	11.9063	37.3063	62.7063	88.1063	113.5063	138.9063	164.3063	189.7063	215.1063
31/64	0.484375	12.3031	37.7031	63.1031	88.5031	113.9031	139.3031	164.7031	190.1031	215.5031
1/2	0.500000	12.7000	38.1000	63.5000	88.9000	114.3000	139.7000	165.1000	190.5000	215.9000
33/64	0.515625	13.0969	38.4969	63.8969	89.2969	114.6969	140.0969	165.4969	190.8969	216.2969
17/32	0.531250	13.4938	38.8938	64.2938	89.6938	115.0938	140.4938	165.8938	191.2938	216.6938
35/64	0.546875	13.8906	39.2906	64.6906	90.0906	115.4906	140.8906	166.2906	191.6906	217.0906
9/16	0.562500	14.2875	39.6875	65.0875	90.4875	115.8875	141.2875	166.6875	192.0875	217.4875
37/64	0.578125	14.6844	40.0844	65.4844	90.8844	116.2844	141.6844	167.0844	192.4844	217.8844
19/32	0.593750	15.0813	40.4813	65.8813	91.2813	116.6813	142.0813	167.4813	192.8813	218.2813
39/64	0.609375	15.4781	40.8781	66.2781	91.6781	117.0781	142.4781	167.8781	193.2781	218.6781
5/8	0.625000	15.8750	41.2750	66.6750	92.0750	117.4750	142.8750	168.2750	193.6750	219.0750
41/64	0.640625	16.2719	41.6719	67.0719	92.4719	117.8719	143.2719	168.6719	194.0719	219.4719
21/32	0.656250	16.6688	42.0688	67.4688	92.8688	118.2688	143.6688	169.0688	194.4688	219.8688
43/64	0.671875	17.0656	42.4656	67.8656	93.2656	118.6656	144.0656	169.4656	194.8656	220.2656
11/16	0.687500	17.4625	42.8625	68.2625	93.6625	119.0625	144.4625	169.8625	195.2625	220.6625
45/64	0.703125	17.8594	43.2594	68.6594	94.0594	119.4594	144.8594	170.2594	195.6594	221.0594
23/32	0.718750	18.2563	43.6563	69.0563	94.4563	119.8563	145.2563	170.6563	196.0563	221.4563
47/64	0.734375	18.6531	44.0531	69.4531	94.8531	120.2531	145.6531	171.0531	196.4531	221.8531
3/4	0.750000	19.0500	44.4500	69.8500	95.2500	120.6500	146.0500	171.4500	196.8500	222.2500
49/64	0.765625	19.4469	44.8469	70.2469	95.6469	121.0469	146.4469	171.8469	197.2469	222.6469
25/32	0.781250	19.8438	45.2438	70.6438	96.0438	121.4438	146.8438	172.2438	197.6438	223.0438
51/64	0.796875	20.2406	45.6406	71.0406	96.4406	121.8406	147.2406	172.6406	198.0406	223.4406
13/16	0.812500	20.6375	46.0375	71.4375	96.8375	122.2375	147.6375	173.0375	198.4375	223.8375
53/64	0.828125	21.0344	46.4344	71.8344	97.2344	122.6344	148.0344	173.4344	198.8344	224.2344
27/32	0.843750	21.4313	46.8313	72.2313	97.6313	123.0313	148.4313	173.8313	199.2313	224.6313
55/64	0.859375	21.8281	47.2281	72.6281	98.0281	123.4281	148.8281	174.2281	199.6281	225.0281
7/8	0.875000	22.2250	47.6250	73.0250	98.4250	123.8250	149.2250	174.6250	200.0250	225.4250
57/64	0.890625	22.6219	48.0219	73.4219	98.8219	124.2219	149.6219	175.0219	200.4219	225.8219
29/32	0.906250	23.0188	48.4188	73.8188	99.2188	124.6188	150.0188	175.4188	200.8188	226.2188
59/64	0.921875	23.4156	48.8156	74.2156	99.6156	125.0156	150.4156	175.8156	201.2156	226.6156
15/16	0.937500	23.8125	49.2125	74.6125	100.0125	125.4125	150.8125	176.2125	201.6125	227.0125
61/64	0.953125	24.2094	49.6094	75.0094	100.4094	125.8094	151.2094	176.6094	202.0094	227.4094
31/32	0.968750	24.6063	50.0063	75.4063	100.8063	126.2063	151.6063	177.0063	202.4063	227.8063
63/64	0.984375	25.0031	50.4031	75.8031	101.2031	126.6031	152.0031	177.4031	202.8031	228.2031

Appendix 8 Hardness conversion table

Steel HRC, approximate conversion

HRC standard hardness (1471N) {150kgf}	HV	HB		HRC		HS
		Standard ball	Tungsten-carbide ball	A standard load 588.4N {60kgf}	B standard load 980.7N {100kgf}	
68	940	—	—	85.6	—	97
67	900	—	—	85.0	—	95
66	865	—	—	84.5	—	92
65	832	—	739	83.9	—	91
64	800	—	722	83.4	—	88
63	772	—	705	82.8	—	87
62	746	—	688	82.3	—	85
61	720	—	670	81.8	—	83
60	697	—	654	81.2	—	81
59	674	—	634	80.7	—	80
58	653	—	615	80.1	—	78
57	633	—	595	79.6	—	76
56	613	—	577	79.0	—	75
55	595	—	560	78.5	—	74
54	577	—	543	78.0	—	72
53	560	—	525	77.4	—	71
52	544	500	512	76.8	—	69
51	528	487	496	76.3	—	68
50	513	475	481	75.9	—	67
49	498	464	469	75.2	—	66
48	484	451	455	74.7	—	64
47	471	442	443	74.1	—	63
46	458	432	432	73.6	—	62
45	446	421	421	73.1	—	60
44	434	409	409	72.5	—	58
43	423	400	400	72.0	—	57
42	412	390	390	71.5	—	56
41	402	381	381	70.9	—	55
40	392	371	371	70.4	—	54
39	382	362	362	69.9	—	52
38	372	353	353	69.4	—	51
37	363	344	344	68.9	—	50
36	354	336	336	68.4	109.0	49
35	345	327	327	67.9	108.5	48
34	336	319	319	67.4	108.0	47
33	327	311	311	66.8	107.5	46
32	318	301	301	66.3	107.0	44
31	310	294	294	65.8	106.0	43
30	302	286	286	65.3	105.5	42
29	294	279	279	64.7	104.5	41
28	286	271	271	64.3	104.0	41
27	279	264	264	63.8	103.0	40
26	272	258	258	63.3	102.5	38
25	266	253	253	62.8	101.5	38
24	260	247	247	62.4	101.0	37
23	254	243	243	62.0	100.0	36
22	248	237	237	61.5	99.0	35
21	243	231	231	61.0	98.5	35
20	238	226	226	60.5	97.8	34
(18)	230	219	219	—	96.7	33
(16)	222	212	212	—	95.5	32
(14)	213	203	203	—	93.9	31
(12)	204	194	194	—	92.3	29
(10)	196	187	187	—	90.7	28
(8)	188	179	179	—	89.5	27
(6)	180	171	171	—	87.1	26
(4)	173	165	165	—	85.5	25
(2)	166	158	158	—	83.5	24
(0)	160	152	152	—	81.7	24

Note: numbers with () are only for reference.

Appendix 9. Surface roughness comparison table

Profile arithmetic average deviation Ra	Maximum height of the profile Ry	Ten point height of microscopic unevenness Rz	Roughness number N
0.012	0.05	0.05	
0.025	0.1	0.1	N 1
0.05	0.2	0.2	N 2
0.10	0.4	0.4	N 3
0.20	0.8	0.8	N 4
0.40	1.6	1.6	N 5
0.80	3.2	3.2	N 6
1.6	6.3	6.3	N 7
3.2	12.5	12.5	N 8
6.3	25	25	N 9
12.5	50	50	N 10
25	100	100	N 11
50	200	200	N 12
100	400	400	

Note: The above table are valid only when the peak height and the vale depth are identical. General machined surface can only meet this approximately. Values are induced for the convenience of approximate designation.

Appendix 10 Viscosity conversion table

Kinematic viscosity mm^2/s	Saybolt viscosity(universal) Unit:/s @ 100°F	Redwood I viscosity Unit: /s @ 50°C	Engler viscosity E (Degree)
2	32.6	30.8	1.14
3	36.0	33.3	1.22
4	39.1	35.9	1.31
5	42.3	38.5	1.40
6	45.5	41.1	1.48
7	48.7	43.7	1.56
8	52.0	46.3	1.65
9	55.4	49.1	1.75
10	58.8	52.1	1.84
11	62.3	55.1	1.93
12	65.9	58.2	2.02
13	69.6	61.4	2.12
14	73.4	64.7	2.22
15	77.2	68.0	2.32
16	81.1	71.5	2.43
17	85.1	75.0	2.54
18	89.2	78.6	2.64
19	93.3	82.1	2.76
20	97.5	85.8	2.87
21	102	89.5	2.98
22	106	93.3	3.10
23	110	97.1	3.22
24	115	101	3.34
25	119	105	3.46
26	123	109	3.58
27	128	112	3.70
28	132	116	3.82
29	137	120	3.95
30	141	124	4.07
31	145	128	4.20
32	150	132	4.32
33	154	136	4.45
34	159	140	4.57
35	163	144	4.70
36	168	148	4.83
37	172	153	4.96
38	177	156	5.08
39	181	160	5.21
40	186	164	5.34
41	190	168	5.47

Kinematic viscosity mm^2/s	Saybolt viscosity(universal) Unit:/s	Redwood I viscosity Unit: /s	Engler viscosity E (Degree)
42	195	172	5.59
43	199	176	5.72
44	204	180	5.85
45	208	184	5.98
46	213	188	6.11
47	218	193	6.24
48	222	197	6.37
49	227	201	6.50
50	231	205	6.63
55	254	225	7.24
60	277	245	7.90
65	300	266	8.55
70	323	286	9.21
75	346	306	9.89
80	371	326	10.50
85	394	347	11.20
90	417	367	11.80
95	440	387	12.50
100	464	408	13.20
120	556	490	15.80
140	649	571	18.40
160	742	653	21.10
180	834	734	23.70
200	927	816	26.30
250	1159	1020	32.90
300	1391	1224	39.50

Note: $1mm^2/s=1cst$